RESOURCE MANAGEMENT PLAN

ANOKA COUNTY DITCH 53-62

June 23, 2006

(EDITED AUGUST, 2006)

Prepared for:

RICE CREEK WATERSHED DISTRICT

Prepared By:

Emmons & Olivier Resources, Inc.
651 Hale Avenue North.
Oakdale, Minnesota 55128

Jason R. Naber	Greg Graske, PE	Elizabeth Nixon, PWS
Natural Resource Specialist	Watershed Engineer	Wetland Scientist

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

ACRONYMS USED

ACD – Anoka County Ditch

BWSR – Minnesota Board of Water and Soil Resources

CDA – Contributing Drainage Area

CWA – United States Clean Water Act

EPA – United States Environmental Protection Agency

PWI – Minnesota Protected Waters and Wetlands Inventory

MLCCS – Minnesota Land Cover Classification System

MNDNR – Minnesota Department of Natural Resources

MNRAM – Minnesota Routine Assessment Method (for wetland functions and values)

MPCA – Minnesota Pollution Control Agency

NHP – Minnesota Natural Heritage Program

NPDES – National Pollution Discharge Elimination System

NWI – National Wetlands Inventory

RCWD – Rice Creek Watershed District

RMP – Resource Management Plan

TMDL – Total Maximum Daily Load

USACE – United States Army Corps of Engineers

WCA – Minnesota Wetlands Conservation Act

WPA – Wetland Preservation Area

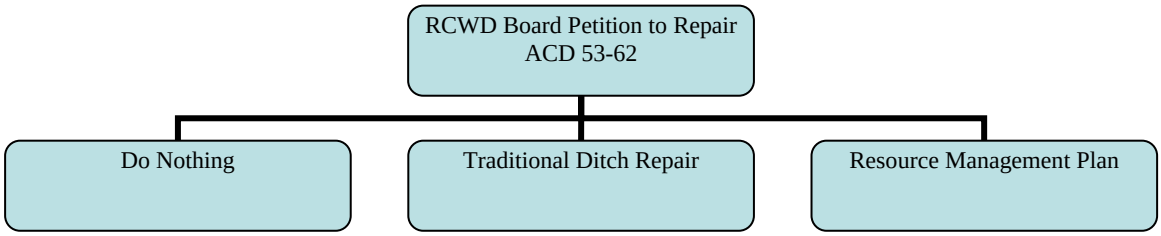
WPZ – Wetland Preservation Zone

I. EXECUTIVE SUMMARY

The purpose of this Resource Management Plan (RMP) is two-fold:

1. To satisfy the Rice Creek Watershed District's (RCWD) own petition to repair Anoka County Ditch 53-62 (ACD 53-62).
2. To provide a resource and conservation-based framework for aquatic resource management particularly as development occurs within the ACD 53-62 watershed basin. Water quality, quantity, and flow rates must be addressed in light of forecasted development and associated impervious area.

The formation of this plan was instigated by the RCWD obligation to repair and maintain ACD 53-62 as the drainage authority for all public ditches within their jurisdiction. The RCWD filed a petition to repair the ditch system under provisions of Chapter 103E (Minnesota Drainage Law). The RCWD evaluated 3 ditch repair alternatives as shown in the graphic below:



A more detailed schematic of the repair options and process involved in this RMP is included in Appendix M at the end of the report.

The Plan serves as the Engineer's Report for the purpose of ditch repair. It provides analysis of the three alternatives and recommends the RMP alternative for the following reasons:

1. It is the most fiscally prudent alternative.
2. It meets RCWD's obligations under the Minnesota Drainage Law Chapter 103E.
3. It provides a comprehensive approach to the regulation of wetlands and meets the provisions of Local Comprehensive Wetland Protection and Management Plans (8420.0650) under the Minnesota Wetland Conservation Act.
4. It is consistent with other regulatory programs, particularly Federal requirements specified under Sections 401 and 404 of the Clean Water Act.
5. It provides the RCWD with another mechanism to address water quality impairments of Golden Lake, a downstream receiving water body of ACD 53-62 that has been identified as an impaired water by the Minnesota Pollution Control Agency (MPCA).

The strategy of the RMP is to evaluate resources (wetlands, uplands, wildlife, drainage, flood storage, etc.) at a landscape level scale, and then to provide a regulatory framework for maintaining and improving these resources in a developing landscape. To implement the RMP in an effective manner, the RCWD must do the following:

1. **Obtain approval from the Minnesota Board of Water & Soil Resources (BWSR) for a Local Comprehensive Wetland Protection and Management Plan under 8420.0650 of the Minnesota Wetland Conservation Act.**
2. **Adopt an implementing rule under 8420.0650 of the Minnesota Wetland Conservation Act.**
3. **Submit the RMP to a federal review process under Section 404 of the Clean Water Act, so that CWA Section 404 principles can be incorporated into the RMP, and the RMP can be incorporated by reference into subsequent individual CWA Section 404 permit evaluations.**

This document functions as a supplement to individual permit applications under state and federal wetland regulations. In addition to these official regulatory approvals and the RCWD's obligations under Minnesota Drainage Law, the RMP was developed to be consistent with the following:

1. The City of Blaine Comprehensive Plan and Northeast Area Plan Amendment
2. Minnesota Department of Natural Resources (DNR) Public Waters Rules (103G).
3. Metropolitan Council's 2030 Regional Development Framework

It is important to note that the RCWD does not regulate land use, thereby limiting its influence as to the nature, location, and size of future development in the ACD 53-62 watershed. The RCWD relies on local governments (City of Blaine) to guide land use in a manner consistent with their overall goals. The RMP attempts to mesh their land use plans with identified resource protection priorities.

Functionally, the RMP is implemented in incremental steps as land use changes are proposed by landowners within the ACD 53-62 watershed. The key elements of the plan (preservation of high quality natural resources by conservation easements, restoration of degraded wetlands, increased flood storage and infiltration, etc.) are measures that property developers/owners will incorporate into their overall site plans as part of their permit application approval from the RCWD.

The RMP utilizes the standard processes currently in place for regulating projects proposing to impact wetlands (i.e. avoiding, minimizing, and replacing impacted wetlands) under the WCA and Section 404 of the Clean Water Act. The RMP modifies the following elements of this standard process to encourage applicants to avoid impacts, maintain, restore, preserve, and enhance high priority areas (see Wetland Preservation Zone):

1. The range of actions available for wetland replacement/mitigation credit (see Appendix I) is expanded and conditioned with respect to watershed-based location within the RMP.

2. The amount of wetland replacement/mitigation credit available for specific actions (i.e. wetland restoration, upland buffer establishment, etc.) is increased or decreased depending on how the actions mesh with the RMP's goals.
3. Preferable wetland mitigation/replacement areas are identified at a landscape scale to direct applicants in their site planning.
4. Restrictions and disincentives (i.e. buffer requirements, increased replacement ratios, etc.) have been developed to discourage applicants from impacting high priority areas.
5. Prescriptive conservation easements will be important for long-term preservation of identified high quality natural areas.

Specific benefits the RMP provides to landowners/potential developers include the following:

1. A permit review process (see Section IV) whereby regulatory agencies with differing rules (RCWD and St. Paul District COE) can apply consistency in sequencing and mitigation that is specific to this watershed and landscape. Identification and prioritization of resources at a landscape scale has been conducted for the applicant's parcel prior to the application, thereby eliminating the potential time and expense typically incurred by the applicant to supply the regulatory agencies with some of the information needed in their review. In addition, this will give the potential applicant specific guidance in developing off-site and on-site alternatives.
2. An expanded range of mitigation options and credit allocations will give applicants maximum flexibility in designing a project that meets their land use needs and resource enhancement/protection goals of the RCWD.
3. Landowners within identified high priority areas will benefit from project designs of upstream landowners that will be required to maximize water storage and water quality functions.

The following document provides the details of the RMP as expressed above, shows how the RMP complies with all applicable regulatory guidance and rules, and provides the technical basis for the RMP.

The RMP fulfills the RCWD's obligation under Drainage Law and provides a framework for permitting within the geographic scope of the Plan. The RCWD will adopt a rule including specific requirements of this Plan that vary from traditional Wetland Conservation Act and is consistent with Section 401 and 404 procedural requirements.

The permit application process under the RMP differs from the normal State and Federal process by varying wetland impact calculation depending on wetland quality, reducing replacement credit where location does not increase landscape function of existing wetlands, prioritizing wetlands on a watershed basis, and requiring planning level alternatives analysis as part of sequencing. The compatibility and differences with State and Federal process is discussed in Section IV. Because the RMP provides priorities on a watershed basis, applicants are able to evaluate their development proposal in a watershed-based context that should be consistent with state and federal programs and cumulative impacts.

Figure 1: Position of 53-62 Subwatershed in the RCWD and Metropolitan Twin Cities

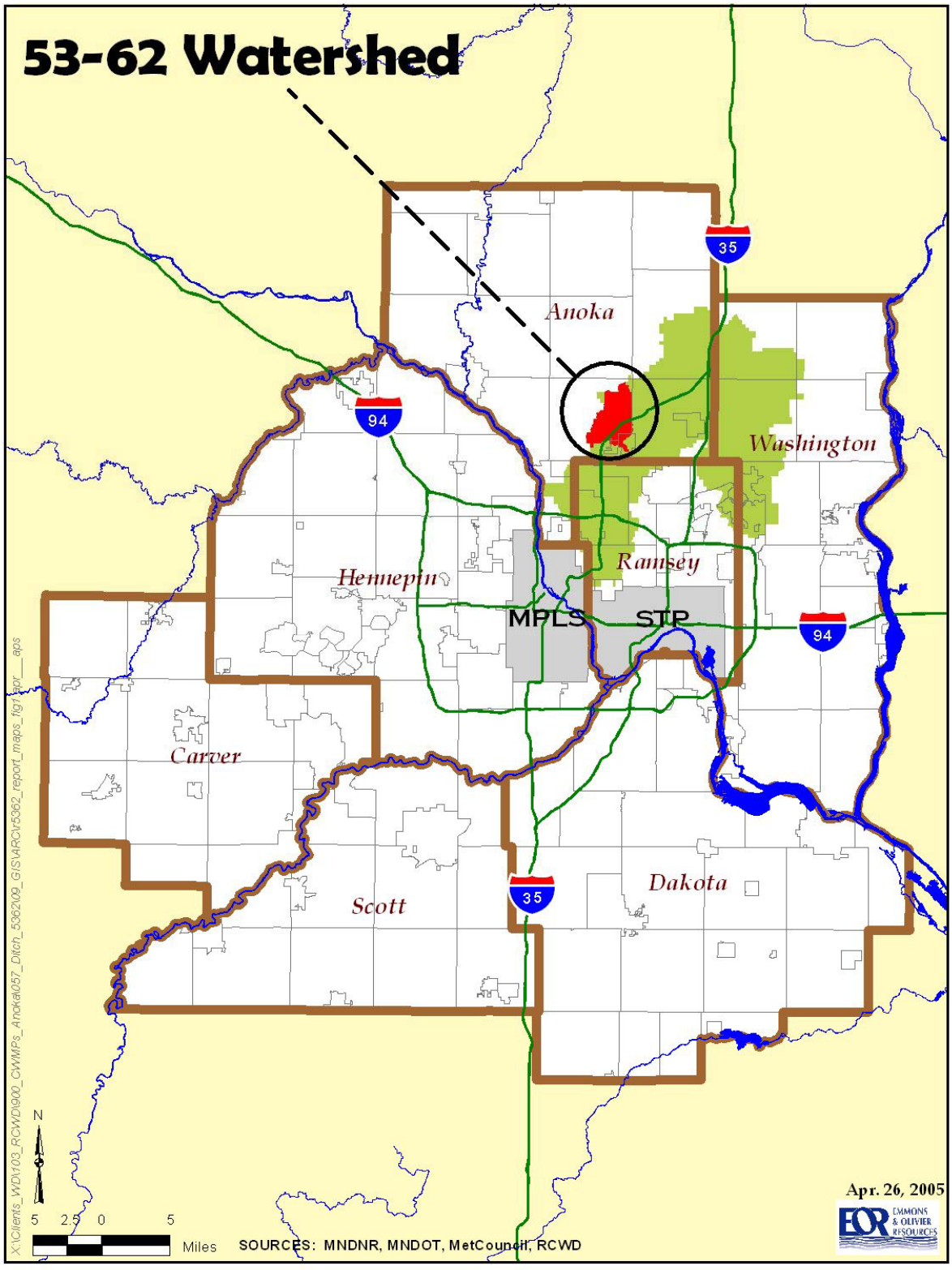
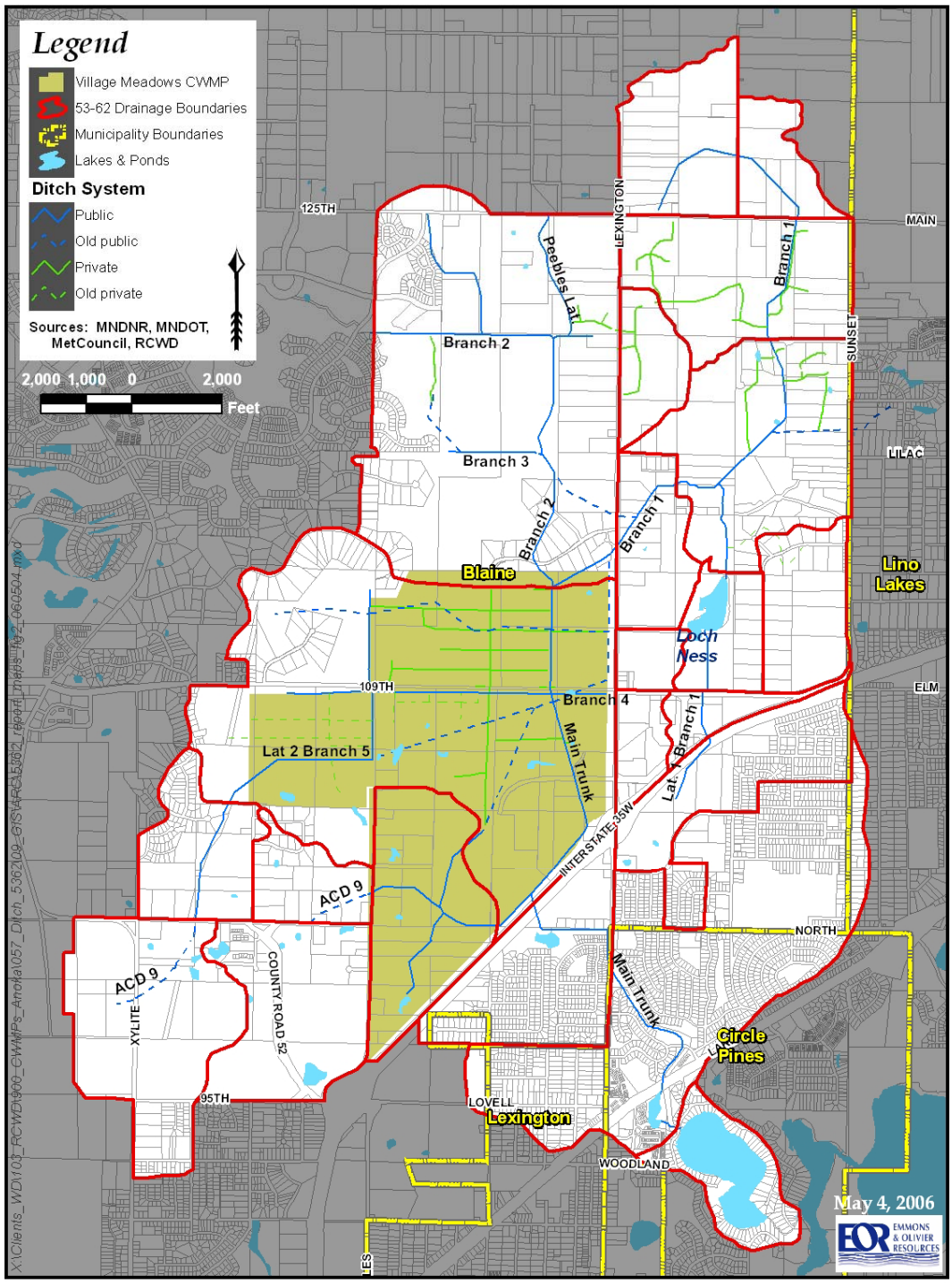


Figure 2: ACD 53-62 Subwatershed



II. BACKGROUND

The ACD 53-62 ditch system is in the west-central portion of the RCWD in southern Anoka County on the northern edge of the Minneapolis/St. Paul metropolitan area (Figure 1). The geomorphic region is known as the Anoka Sand Plain. The ditch system is almost entirely within the City of Blaine with the exception of the most downstream section, which flows through the City of Circle Pines. The subwatershed of the ACD 53-62 ditch system is primarily north of the Interstate 35W culvert. Included in the 53-62 subwatershed is the Village Meadows CWMP approved by the state. The Village Meadows CWMP does not conflict with the proposals in the 53-62 RMP. The Village Meadows CWMP approval contained the following contingencies: site-specific functional assessments reviewed by the TEP; approval of lateral effect estimates by the TEP (including additional expertise); and that the CWMP does not eliminate the need for applicants to obtain approval from the USACE.

The major questions to be addressed by this RMP are described below. Additional frequently asked questions are in Appendix G.

WHAT ARE THE ISSUES PREDICATING THIS RMP?

The geographic area of this RMP is under intense development pressure. It contains many acres of valuable wetland resources. Stormwater conveyance is being provided by an agricultural ditch system and the entire drainage area contributes stormwater to Golden Lake, an impaired water body.

Urban Growth

The City of Blaine is the fastest growing municipality in the Twin Cites metropolitan area. The location of this RMP is at the intersection of Interstate 35 W and Lexington Avenue. Lexington Avenue has recently been upgraded from two lanes to four, with the ultimate design of six lanes and the expected capacity of over 80,000 cars per day. The entire RMP is scheduled to be included into the Metropolitan Council Municipal Urban Service Area (MUSA), in a phased fashion, over the next 15 years. Access to urban services allows for denser and more intensive development than would be possible in areas that are not connected to these services. Population growth is projected at 15.5% and household growth projected at 24.2% during this decade. Table 1 shows population and household growth trends for the City of Blaine from census data and Metropolitan Council projections to the year 2030. Figure 3 illustrates the Metropolitan Council 2020 land use plan for the 53-62 drainage area.

Table 1. Population and Household Growth for the City of Blaine, Minnesota.

City or Township	1990	2000	2010	2020	2030
Population	38,975	45,014	65,000	72,000	76,000
Households	12,825	15,926	24,800	29,300	31,200

Source: Metropolitan Council

Extensive Wetlands
Wetlands are extensive within the RMP area (approximately 2,400 acres), encompassing about 50% of the total land area. Many of the wetlands contain high quality plant communities and some contain rare and protected plants. The wetlands also provide habitat for significant wildlife species. Unmanaged developmental impacts to these wetlands will degrade the vegetative integrity, water quality enhancement potential, flood storage capacity and wildlife habitat functions these resources currently provide. Figures 4, 5 and 6 illustrate the land cover type, NWI wetlands and Protected Waters within the RMP area. Figure 7 provides an aerial photo of the RMP area taken in 2003.

Agricultural Ditch System
The network of public and private ditches currently providing storm water conveyance to this area was built in the late 1800's and early 1900's. The historical sequence of ditch construction is given in Appendix B. The public ditch system was designed to provide agricultural drainage to farmers. The ditch system no longer provides the same level of drainage. Because landowners along the ditch were concerned about the functional capacity of ditch, RCWD petitioned itself to evaluate a repair.

Impaired Water- Golden Lake
Golden Lake is currently listed by the Environmental Protection Agency as a TMDL (Total Maximum Daily Load) nutrient-impaired water. Once a water body is listed, it must be brought to acceptable standards and cannot be further degraded. Unmanaged development within the RMP will further degrade the water quality of Golden Lake.

WHY IS THIS RMP RCWD'S RESPONSIBILITY?

It is RCWD's responsibility to evaluate the drainage needs of the area, balance those needs with wetland protection, and enhance the water quality of Golden Lake. The RCWD is the Drainage Authority for all public ditches within its jurisdictional boundary. The management and maintenance of this public storm water conveyance system is governed by rules set forth in the Minnesota Drainage Law. RCWD is also the Local Government Unit responsible for implementing the Wetland Conservation Act (WCA) within the RMP area. Golden Lake receives stormwater drainage from four municipalities. The jurisdictional boundary of RCWD does not follow municipal boundaries. In light of these factors the RCWD was granted funding by the Environmental Protection Agency to undertake the TMDL study to enhance the water quality of Golden Lake. Only the RCWD has the authority to undertake such a comprehensive planning effort as this RMP.

WHY IS RCWD ADDRESSING THIS ISSUE THROUGH AN RMP?

The RMP provides a unique mechanism to satisfy the multiple responsibilities of the RCWD as expressed above while minimizing public costs, being consistent with other plans and regulations, and providing a long-term solution with minimal follow-up costs. By evaluating various ditch repair scenarios, the RMP was developed and found to be the best alternative to meet the multiple responsibilities of the RCWD. In addition, the RMP provides a mechanism for the meshing of State and Federal programs that regulate wetlands, avoids large outlays of

public monies for a major ditch repair, and provides a long-term and ecologically preferable solution to balance drainage and ecological preservation/enhancement.

HOW HAS THE RCWD ENSURED THAT THE PUBLIC INTEREST HAS BEEN MET?

The RMP has been developed through a lengthy process of public input. The process began by notifying potentially interested parties at the onset of the RMP development. Many meetings were held over the past year with agencies and the City of Blaine to discuss many technical issues needed for preparation of the draft RMP. Once a draft RMP was written, the RCWD initiated a formal review and approval process.

To be consistent with State rules governing water plans and Federal rules pertaining to programmatic permits, the RCWD has fulfilled its obligations for public review. The public review process included the following steps:

1. Public Notice to parties at the beginning of this process per 8420.0650 as well as Chapter 103E process requirements.
2. Regulatory Meetings-Meetings with regulatory agencies to discuss contents of the RMP.
3. Public Involvement- Conduct open house to introduce RMP components to public. Information was disseminated in an "Information Fair" format followed formal public comment solicitation by the RCWD Board and a survey of Public Values was conducted.
4. RMP Final Report- Documentation of comments received and Final Report writing.
5. Agency Review- Plan review and adoption by State and Federal agencies.
6. Public Hearing held for ditch repair procedural elements of the RMP.
7. Plan and Rule Adoption- RCWD Board adoption of RMP and Rule.

Figure 3: Metropolitan Council 2020 Land Use for 53-62 Drainage Area.

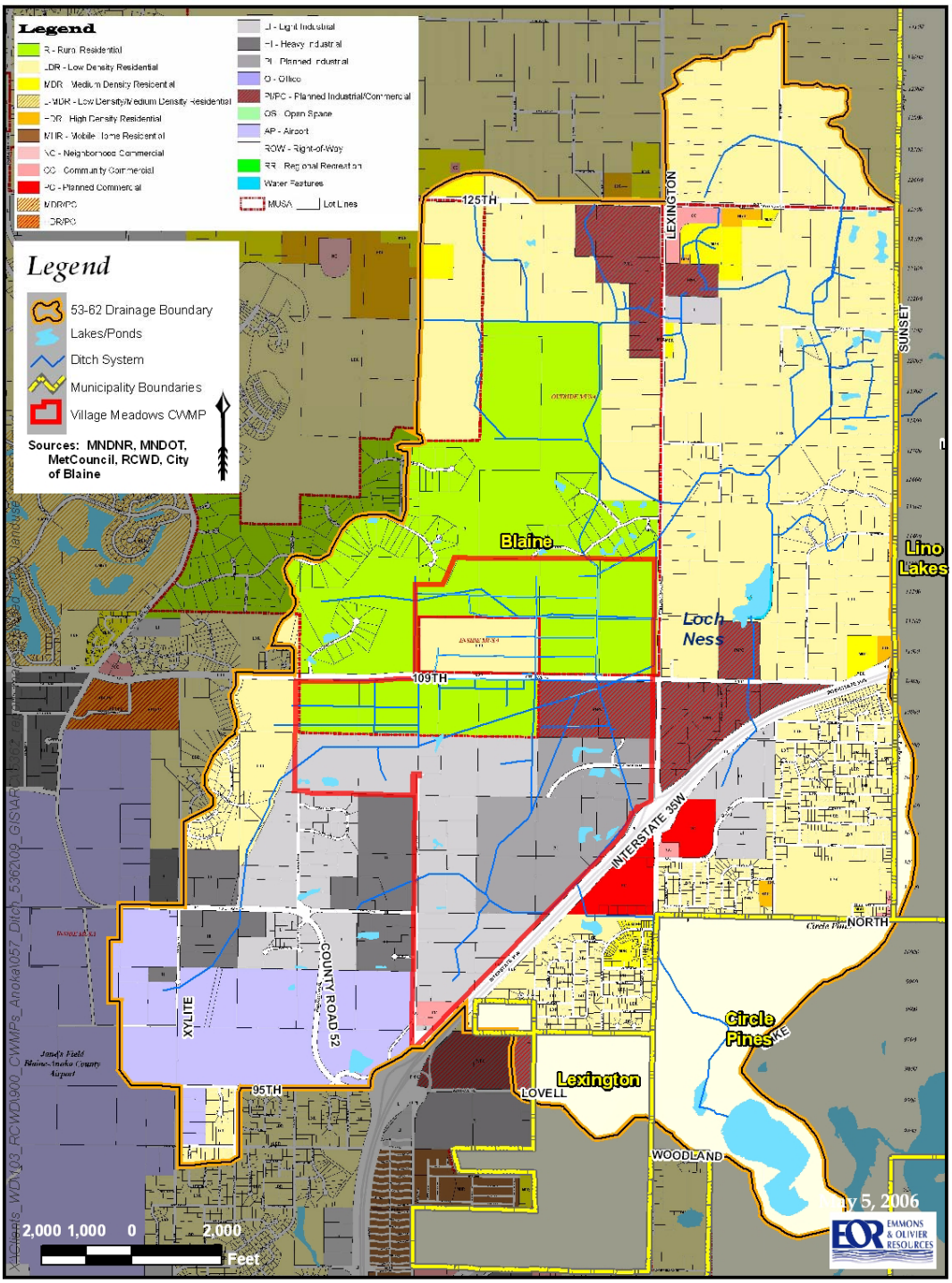


Figure 4. MLCCS Classifications within the RMP area.

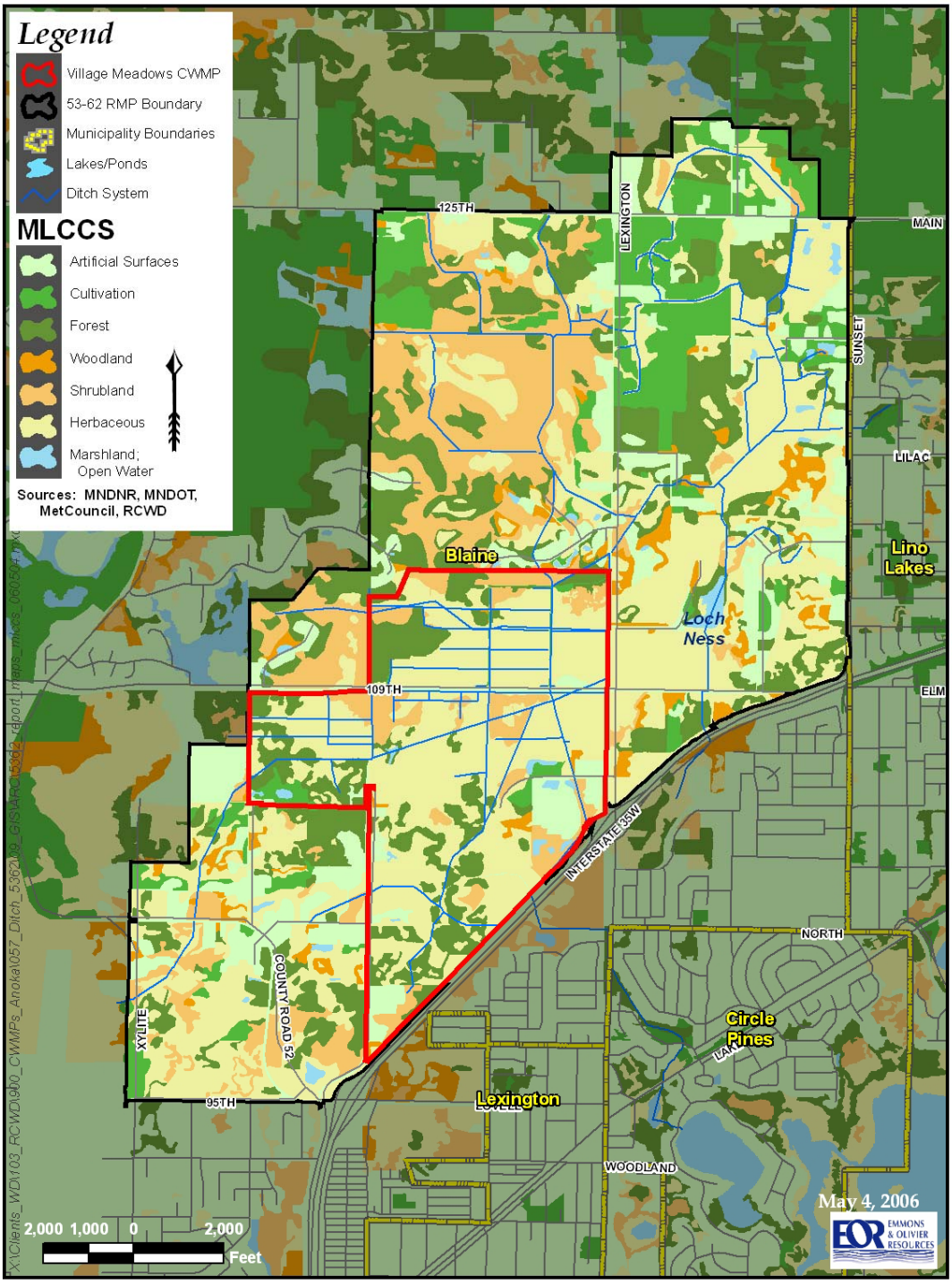


Figure 5. NWI Classifications within the RMP Area.

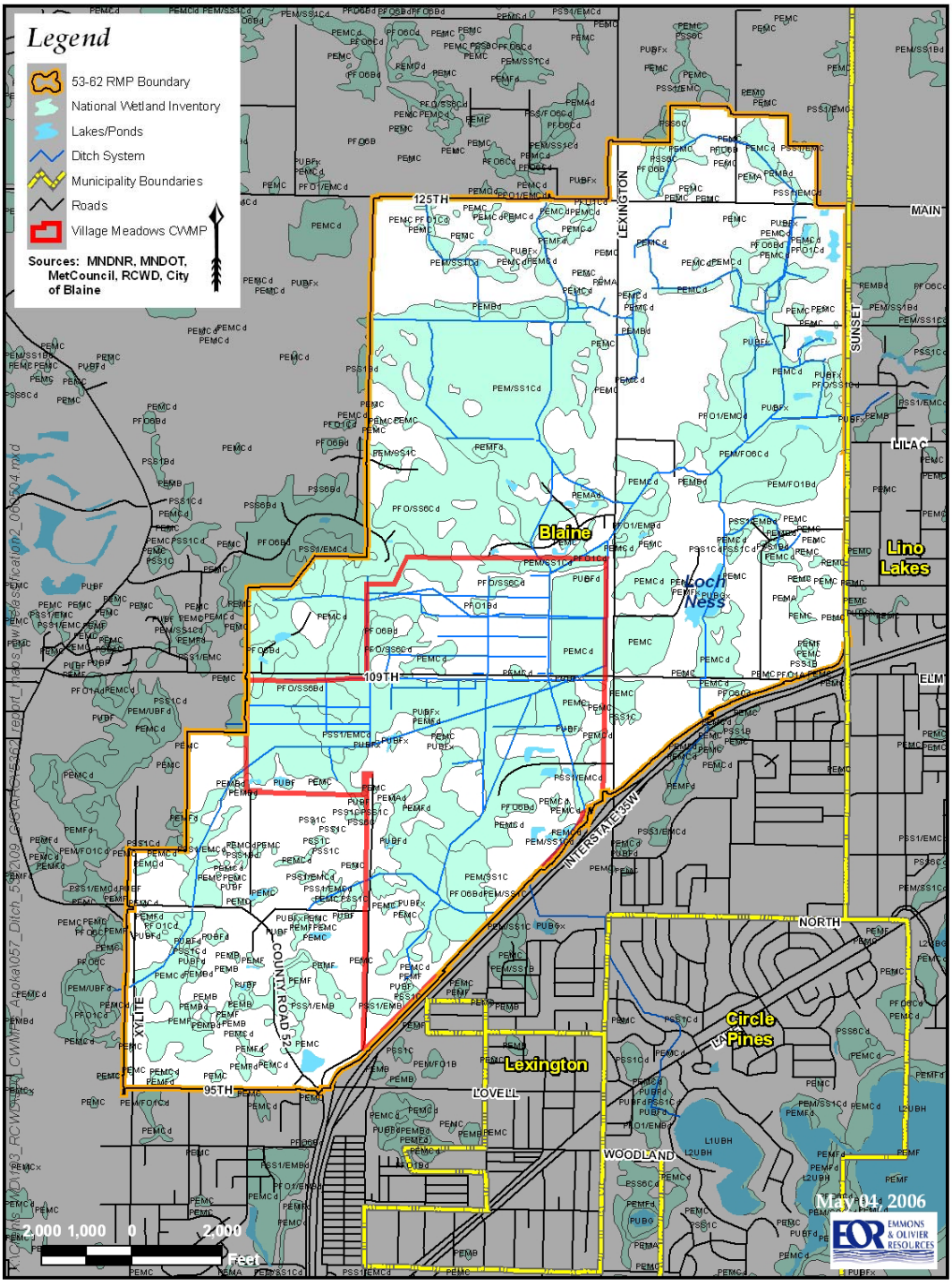


Figure 6. PWIs within the RMP area.

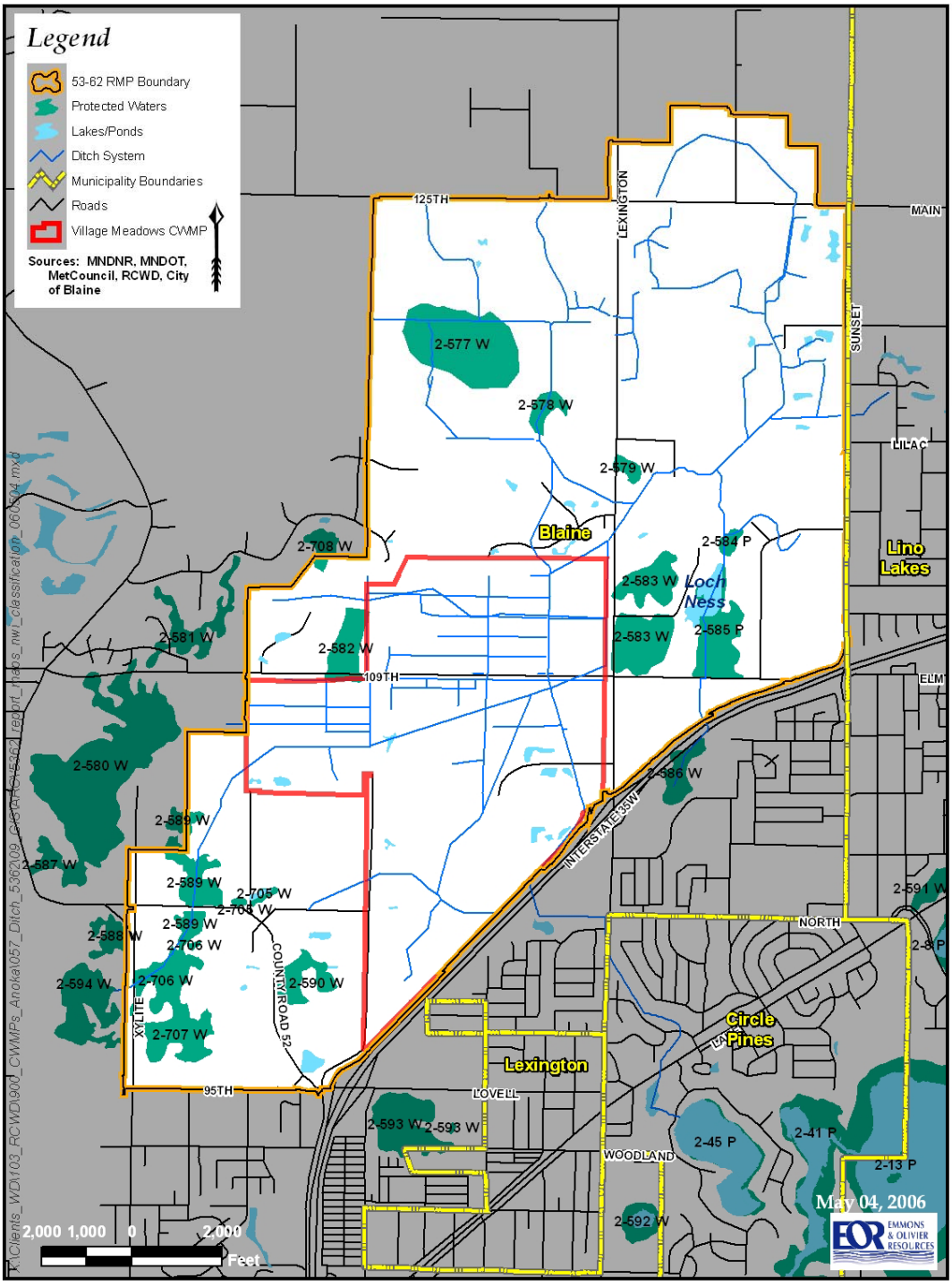
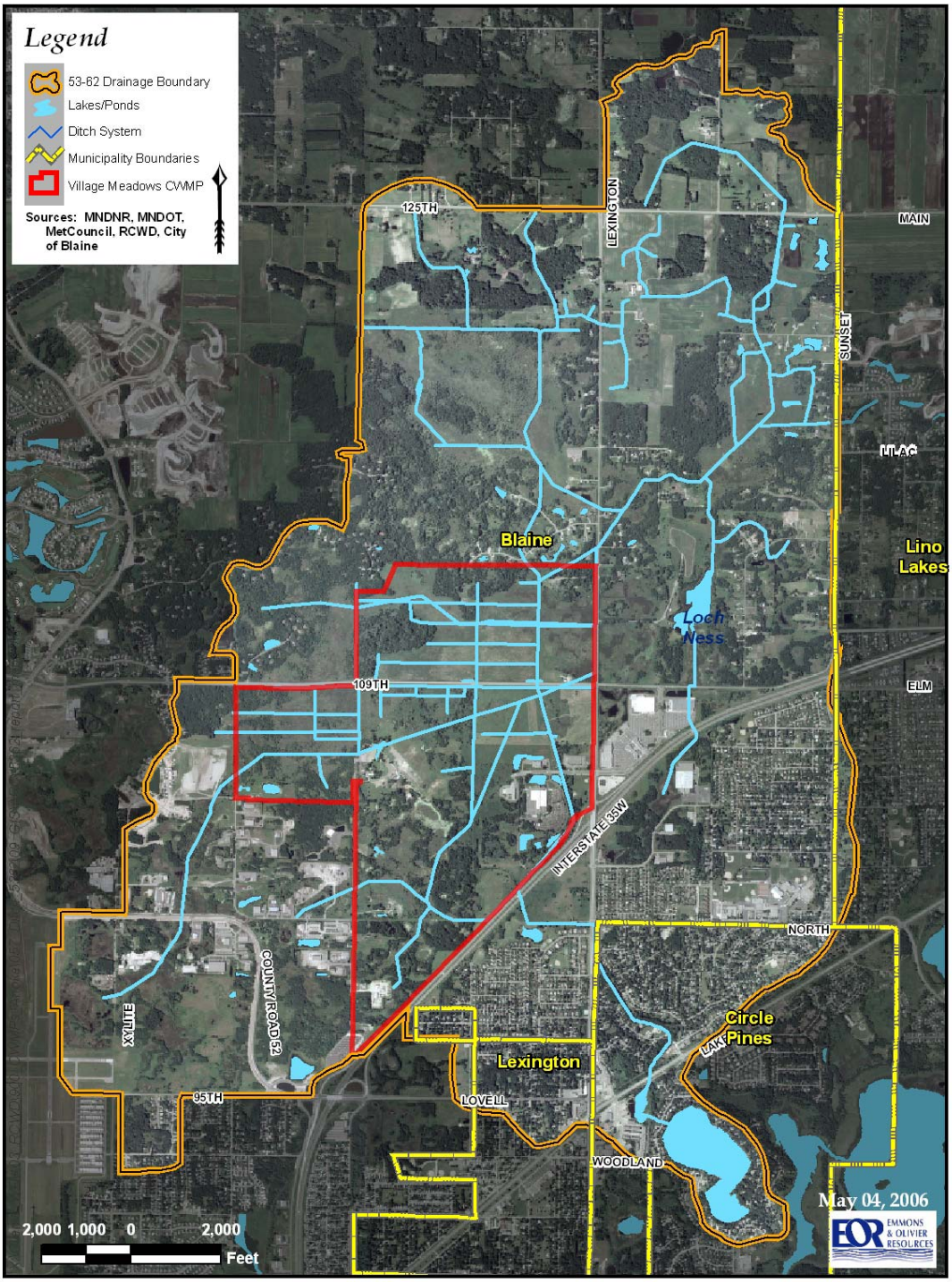


Figure 7: 2003 Aerial Photograph for the 53-62 Drainage Area.



III. COMPARISON OF DITCH REPAIR ALTERNATIVES

On June 11, 2003 the RCWD petitioned itself as the ditch authority for a repair of ACD 53-62 because of increased development pressures on this inadequate drainage system. Analysis of ditch repair alternatives is intended for both official ditch repair proceedings and as large-scale sequencing under federal and state rules protecting wetlands and aquatic resources. This document considers repair alternatives for the entire subwatershed of the 53-62 ditch system. The three ditch repair alternatives that were evaluated are:

1. **No Action**: the ditch system remains as is;
2. **Ditch Repair**: repair the agricultural ditch system based upon the officially adopted profile;
3. **Resource Management Plan**: watershed runoff, ditches, and wetland function are considered jointly in watershed-based management.

Appendix E contains an analysis of the Official Profile for each of the branches of ACD 53-62. Additional profile information is also included in the July 16, 2003 Engineer's Repair Report.

The analysis of ditch repair alternatives was conducted assuming fully developed conditions based on the City of Blaine Comprehensive Plan and Northeast Area Plan Amendment. In addition, TMDL modeling done in collaboration with this RMP makes similar fully-developed assumptions consistent with this local plan. Fully-developed conditions were assumed so that the effectiveness of the repair alternatives could be evaluated for a scenario that represents the most potential impact to the ditch, wetlands, and other natural resources. By assuming fully-developed conditions for the analysis, the RMP **does not** encourage, commit to, or require development to occur. It simply uses the fully-developed scenario to simulate a worst-case scenario for potential impacts to valued resources.

EVALUATION CRITERIA

The ditch repair alternatives were compared by considering the most relevant issues related to the ditch, wetlands, and downstream resources. These issues include the following:

1. Hydrologic/Hydraulic functioning of the ditch
2. Legal requirements of ditch law
3. Compensatory mitigation required for impacted wetlands
4. Downstream water quality
5. Maintain and/or increase wetland quantity, quality, function and biological integrity

Specifically, the following factors were evaluated for each repair alternative:

- Water Quality
- Floodplain Elevation
- Storm Water Outflow Rates
- Wetland Functions

- Wildlife Habitat
- Lateral drainage effect of repair
- Effect of each repair alternative on the use of benefited lands
- Hydraulic efficiency of ditch system with respect to benefited properties

RESULTS OF ALTERNATIVE COMPARISON

Alternative 1: No Action
Under this alternative, the RCWD could determine that the most fiscally prudent and environmentally sensitive alternative is to take no action. Thus, the existing ditch system would remain essentially as it is, with minor maintenance for obstructions. This alternative would be chosen if the RCWD found that there is no fiscal or environmental justification for any repair activities within ACD 53-62. The ditch system would not be altered and other aquatic resources would not receive any additional protection over existing wetland rules. Development would occur within the subwatershed as it currently does, and existing RCWD, State and Federal rules would apply.

Land owners are highly motivated to enhance and maintain the drainage of their land due to the high real estate values in the area. Existing state and federal laws provide little protection to wetland resources potentially drained by this activity due to various exemptions and exceptions for maintenance of existing drainage systems. Under the federal law 33 USC § 1344 part (f)(1)(C) states: non-prohibited discharge of dredged or fill material (C) for the purpose of construction or maintenance of farm or stock ponds or irrigation ditches, or the maintenance of drainage ditches is not prohibited by or otherwise subject to regulation under this section or section 1311(a) or 1342 of this title (except for effluent standards or prohibitions under section 1317 of this title). Just advanced notification of the Corps is required before repair work begins. Ditch repair impacts to Type 3, 4, 5 wetlands require mitigation under state wetland law (MN Rule 8420.0122 Subp. 2C). Only under the drainage exemption are all other wetland types exempt from replacement.

Under the no action alternative wetland functions would be significantly reduced and the downstream water quality of Golden Lake would be significantly impacted.

Alternative 2: Repair Agricultural Ditch System – Full Repair and Feasible Repair
Under the second alternative, the RCWD could repair the ditch to the official plan and profile. Lawfully connected private ditches could be maintained by landowners through excavation. This scenario is expected to increase their individual site drainage over existing conditions. The depth and capacity of private ditches could not be improved with respect to the capacity of the connected public ditch. Private ditches within the 53-62 drainage area are assumed to be lawfully connected. For all private ditch maintenance, evidence must be provided to demonstrate that the ditch is lawfully connected to the public ditch. In evaluating this alternative the RCWD must be realistic about the wholesale shifts in land use throughout the subwatershed that have occurred since the original design of the ditch system. Agricultural land use is rapidly declining as a reason for the ditch system. Also, in evaluating this alternative, the RCWD must be cognizant of the environmental functions lost to fracturing the vast wetland complex within the planning area and the mitigation costs for replacement of these services.

The *full repair* and a variation, the *feasible repair*, were evaluated for this alternative. The feasible repair is a limited scope version that omits any repair to selected upstream segments of some branches. A simplified cost-benefit analysis was conducted for each branch of the drainage system in order to determine which branches of the system would be omitted in the feasible repair analysis. The feasible repair was the 103E standard of rough benefit-cost to benefited lands with the appropriate consideration of public cost and benefits. Repair was deemed "feasible" only for those branch segments where wetland acres converted to upland caused by ditch drainage, exceeded the acreage of wetland impact requiring mitigation. One of the primary considerations for determining whether or not a branch could be repaired was based on the existence of public waters regulated by the Minnesota DNR. Impacts to DNR regulated public waters resulting from a ditch repair are not afforded the same exemptions as wetlands regulated by WCA. Because of this, environmental permitting and mitigation costs are significantly increased.

Full Repair – Official Profile

Agricultural uses are enhanced by reducing the area of saturated soil. Lowering the culvert and ditch elevations is estimated to effectively drain and convert wetland to upland in parts of the affected wetlands. A technical memorandum details the lateral effect methodology used to predict hydrologic changes resulting from the official profile repair of the ACD 53-62 ditch system (see Appendix N. Interagency Coordination and Technical Memoranda).

The water quality of Golden Lake would be further compromised by this repair scenario without a means of water quality treatment. In order to meet water quality treatment goals of the RCWD in relation to Golden Lake, a treatment basin of approximately 20-acres would be required under full repair plus existing land use. Significant additional treatment features would be required for the future land use planned for the 53-62 drainage area.

The loss and conversion of wetland hydrology is considered a wetland impact according to state and federal wetland law. Discharges associated with ditch repair to their original profile are exempt from mitigation under CWA Section 404 requirements. Ditch repair impacts to Type 3, 4, 5 wetlands require mitigation under state wetland law (MN Rule 8420.0122 Subp. 2C). Only under the ditch exemption are all other wetland types exempt from replacement.

Estimated wetland impacts to non-exempt (Type 3, 4, and 5) wetlands would total approximately 220 acres under the full repair alternative. Technical memoranda are included in Appendix N that identify how wetland basins were typed and how a repair would affect each type. Presumably a minimum of at least 220 acres of existing upland would be needed to meet the first half of the 2:1 required replacement. The second half of the 2:1 (PVC) could be accomplished through existing wetland restoration or buffers. If the case can be made that certain wetlands impacted meet the agricultural wetland definition, the second half of the 2:1 replacement is not required if land use is kept agricultural. Estimated drainage of DNR protected basins under the full repair scenario would result in approximately 180 acres of impact. Due to the WCA wetland replacement siting requirements, replacement would likely be required within the 53-62 subwatershed. This would presumably be very expensive since land in the 53-62 drainage area is developing rapidly, and land values are extremely high.

Feasible Repair – Official Profile

Under this scenario, only branches of the system deemed "feasible" for repair would be included in the overall drainage system repair.

Similar to the full repair scenario, the water quality of Golden Lake would be further compromised by this repair scenario because adequate water quality treatment would not be provided. In order to meet water quality treatment goals of the RCWD in relation to Golden Lake, a treatment basin(s) of approximately 20-acres would be required for a cleaned out ditch system under existing conditions. Significant additional treatment features would be required for the future land use planned for the 53-62 drainage area.

Estimated wetland impacts to WCA regulated Type 3, 4, and 5 basins would total approximately 30 acres under the feasible repair alternative. A minimum of 30 acres of existing upland would be needed for the first half of the required 2:1 replacement. Drainage of DNR protected basins under the feasible repair scenario would result in 10 acres of impact.

Alternative 3: Resource Management Plan

The third alternative is to develop the RMP for the subwatershed of the ACD 53-62 ditch system north and west of Interstate 35W**.** The RMP will fulfill the RCWD Ditch Repair petition in concert with environmental regulations. Wetland functions are higher than the other alternatives when viewed in the context of the 2020 Metropolitan Council land use projections (refer to Appendix K for methods and complete results) and the watershed loading to Golden Lake will be reduced. Wetland resources will be protected and open space will be preserved at minimal cost to taxpayers. During the wetland permitting process, landowners will benefit from access to significant amounts of wetland planning data, early alternatives analysis and sequencing before costly engineering design, and an expanded variety of mitigation methods. Section IV of this RMP contains details of how these are accomplished. Wetland impacts associated with ditch reconstruction proposed for this option (refer to Appendix J) will be calculated as parcels implement the RMP. Impacts are anticipated from ditch reconstruction that both restores hydraulic storage to the ditched wetlands and reestablishes ditch capacity. Restoring storage to ditched wetlands is the hydraulic equivalent to restoring hydrology to partially drained wetlands. The goal is to restore partially drained wetlands as mitigation credit for ditch reconstruction impacts. Design details for each parcel will be evaluated to minimize wetland impacts and replace those unavoidable impacts. All ditch reconstruction will be subject to the rules and permits under the RMP.

Comparison of repair alternatives according to wetland functions was done on the basis of wetland type for each function. The three alternatives were ranked highest to lowest according to score. It is possible for the high score for any given function to be the same for more than one alternative. In these cases, each of the high scores were ranked "highest" in the table below. Table 2 below was developed at the request of the TEP and USACE to summarize the extensive wetland functional analysis work completed in this RMP.

Table 2: Comparison of Ditch Repair Alternatives According to Wetland Function.

Wetland Function	Feasible Repair Alternative	No Action Alternative	RMP Alternative
Maintenance of Characteristic Hydrologic Regime	Highest rank for 5 of 14 wetland types	Highest rank for 0 of 14 wetland types	Highest rank for 10 of 14 wetland types
Flood/Stormwater Attenuation	Highest rank for 5 of 14 wetland types	Highest rank for 1 of 14 wetland types	Highest rank for 10 of 14 wetland types
Downstream Water Quality	Highest rank for 3 of 14 wetland types	Highest rank for 0 of 14 wetland types	Highest rank for 11 of 14 wetland types
Maintenance of Wetland Water Quality	Highest rank for 3 of 14 wetland types	Highest rank for 0 of 14 wetland types	Highest rank for 11 of 14 wetland types
Maintenance of Characteristic Wildlife Habitat Structure	Highest rank for 6 of 14 wetland types	Highest rank for 2 of 14 wetland types	Highest rank for 8 of 14 wetland types
Maintenance of Characteristic Amphibian Habitat	Highest rank for 3 of 14 wetland types	Highest rank for 0 of 14 wetland types	Highest rank for 11 of 14 wetland types
Maintenance of Characteristic Fish Habitat	Highest rank for 3 of 14 wetland types	Highest rank for 0 of 14 wetland types	Highest rank for 11 of 14 wetland types
Vegetative Integrity	Highest rank for 0 of 14 wetland types	Highest rank for 0 of 14 wetland types	Highest rank for 14 of 14 wetland types
All Functions	Highest rank for 28 of 112 possible wetland function/type combinations (**25%**)	Highest rank for 3 of 112 possible wetland function/type combinations (**2.7%**)	Highest rank for 86 of 112 possible wetland function/type combinations (**76.8%**)

Highest rank means the rank compared to the other two alternatives was highest. Wetland types are shown in Appendix K.

Comparison of Repair Alternatives

For comparative purposes, a qualitative benefit assessment was undertaken to objectively evaluate all of the considered alternatives.

Table 3: Benefit Evaluation of All Repair Alternatives (Fully Developed Conditions)

	No Action	Full Repair	Feasible Repair	RMP
Potential to Enhance Water Quality	Moderate	Low	Moderate	High
Potential to Reduce Floodplain Elevations	Low	High	High	High
Potential to Decrease Peak Outflow Rates	Moderate	Low	Moderate	High
Potential for Gain of Wetland Functions	Low	Low	Low	Medium
Potential for Enhancement of Wildlife Habitat	Moderate	Low	Low	High
Potential for Public Approval	Low	Low	Low	High

Potential Cost Savings to Taxpayers	Low	Low	Low	High
Potential Cost Savings to Benefited Properties	High	Low	Low	High

Peak outflow rate reduction is to be accomplished in two ways. The stringent infiltration standards required in the proposed RMP Rule address volume over and above the rate controls standards in existing District rules. A wetland hydrologic restoration strategy proposed for the RMP uses outlet modification that pulses flood water from the channel into the adjacent wetland. This temporary flood storage will aid in reducing peak flows.

Wetland Impact Analysis Summary

Following is a summary of the nonexempt wetland impacts associated with each ditch repair alternative. For the RMP alternative, the names of proposed branch repairs are shown in Appendix J, RMP WPZ Management Area Goals. The branch repairs for the Full and Feasible alternatives are identified in the detailed cost breakdown table in Appendix L. All wetland impacts are tabulated in the technical data provided in Appendix N. Figures 8 and 9 illustrate estimated wetland impacts for the Full Repair and Feasible Repair options.

Table 4. Repair Option Comparison of Estimated Wetland Impacts

Repair Option	WCA Exempt Impacts: Type 1, 2, 6, 7, 8.	Non-exempt Impacts: Type 3, 4, 5 wetlands in place for at least 25-years under the MN WCA	Impacts to MN Public Waters Wetlands (additional Type 3, 4, 5 wetlands)
No Action	0 Acres	0 Acres	0 Acres
Full Repair	250 Acres	220 Acres	180 Acres
Feasible Repair	140 Acres	30 Acres	10 Acres
Resource Management Plan	0 Acres	0 Acres	0 Acres

Wetland and Water Quality Mitigation Summary

As discussed above, the Full Repair and Feasible Repair alternatives mitigation strategy is proposed as wetland creation in available upland areas. The RMP Repair mitigation strategy is to restore partially drained wetlands in the study area. Also, the downstream water quality effects of the repair alternatives must be considered. There are a wide variety of watershed-based small-scale strategies for water quality protection. For the purpose of this analysis the traditional regional treatment pond was considered for the full and feasible repair because it is a simple representation of the magnitude of treatment required and these traditional repairs do not consider large-scale wetland restoration as a repair objective.

Figure 8: Estimated Wetland Impacts for Full Repair Alternative

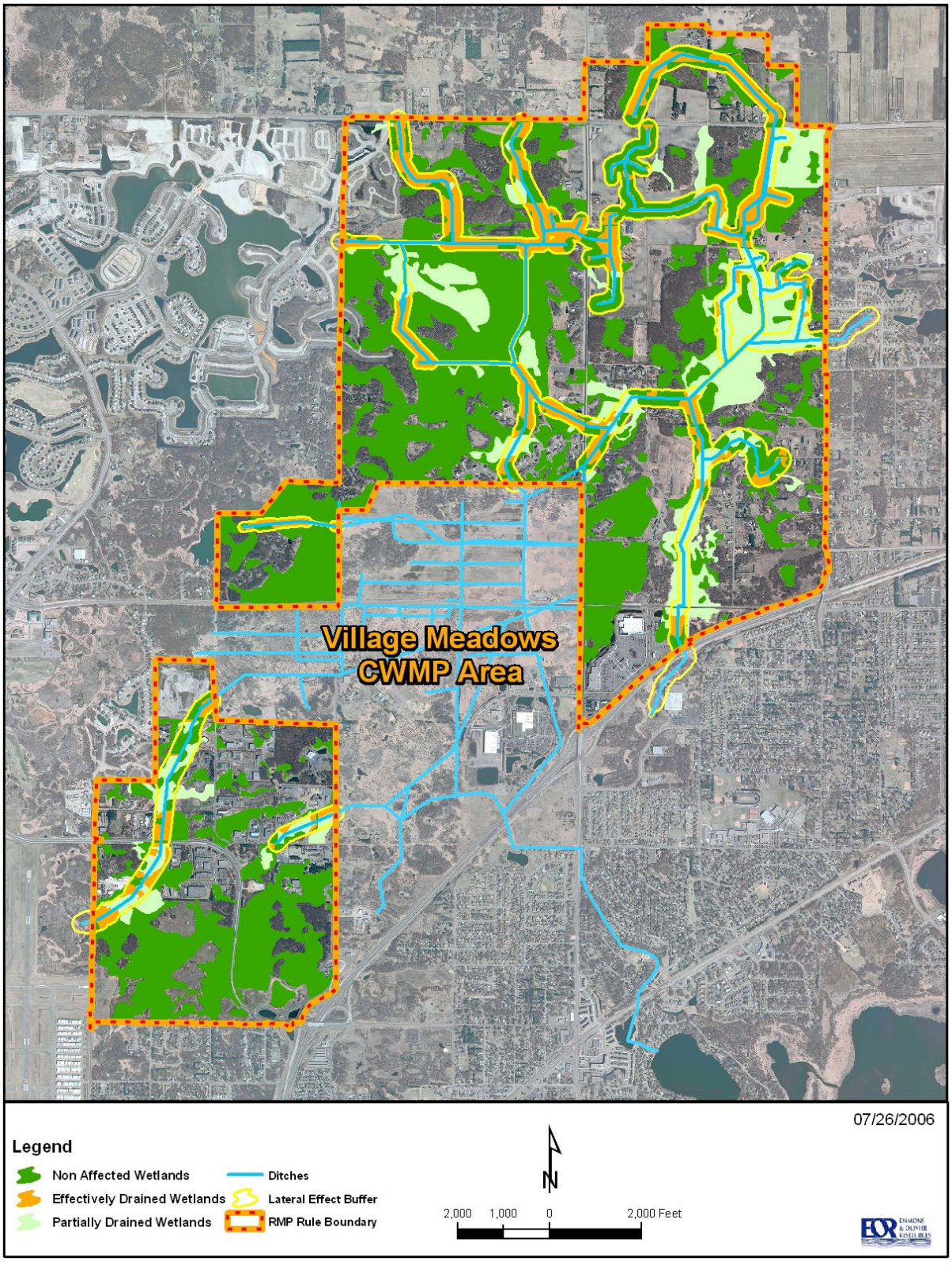
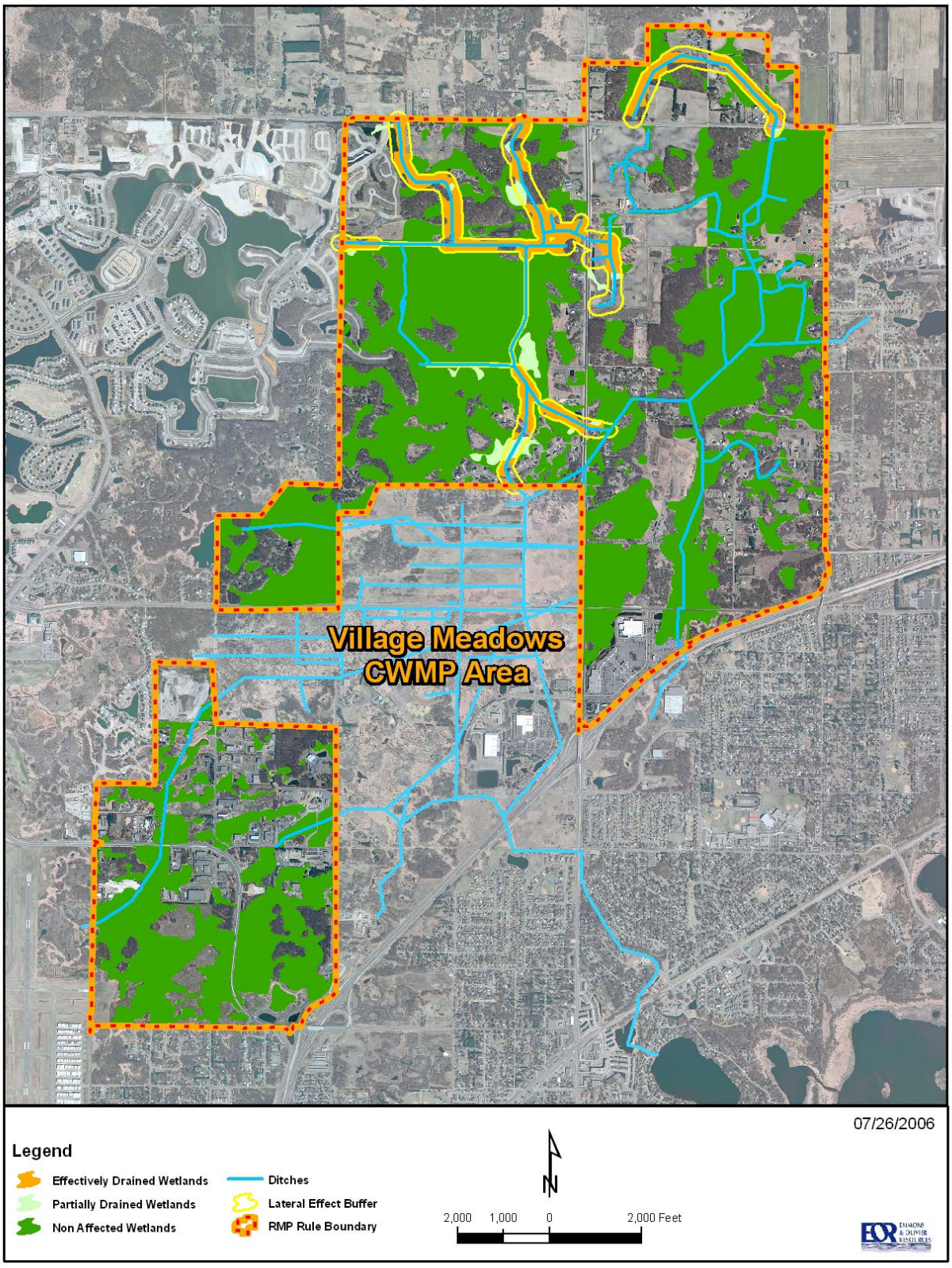


Figure 9: Estimated Wetland Impacts for Feasible Repair Alternative



Cost Analysis

Following are the major actions which would be associated with the repair alternatives and the relative costs associated with each. Because of the wide variation in land costs, the estimate to construct the water quality basins does not include costs required to purchase 20 acres of property. Detailed assumptions and cost breakdowns are included in Appendix L.

Table 5: ACD 53-62 Ditch Repair Alternative Cost Comparison

Repair Alternative	Ditch Costs			Public Costs			Grand Total
	Excavation/ Structures	Mitigation	Sub Total	WQ Treatment	Culvert Replacement	Sub Total	
No Action	$0	$0	$0	$0	$0	$0	$0
Full Repair	$436,000	$24,300,000	$24,736,000	$1,367,000	$549,000*	$1,916,000	$26,652,000
Feasible Repair	$348,000	$2,187,000	$2,535,000	$1,367,000	$214,000**	$1,581,000	$4,116,000
RMP	$284,000	$0	$284,000	$0	$0	$0	$284,000

Capacity of RMP Drainage System

The capacity of the ditch system under the RMP alternative will not exceed the capacity of the official ditch system. If culvert and ditch crossing upgrades are needed for implementation of the RMP, the sizes of each will not exceed those illustrated in Appendix L for the Traditional Repair Scenario. In some cases existing and proposed crossings may require structural modifications needed to enhance wetland restoration activities. These control structures will be designed such that there is not a resulting increase in the existing 100-year flood elevation. Further evaluation of each proposed crossing and control structure will be made by RCWD engineers at the time of permit application.

IV. RESOURCE MANAGEMENT PLAN

The 53-62 RMP provides a fiscally prudent mechanism that enables the District to accomplish five key goals:

- Ensure drainage rights are respected while accounting for all ditch law obligations including those pertaining to environmental costs
- Ensure that overall wetland functions within the planning area are enhanced when compared to other feasible, foreseeable repair alternatives
- Ensure water quality is enhanced before runoff enters Golden Lake
- Provide a mechanism to facilitate implementation of open space plans through permanent wetland and open space protection
- Accomplish water resource management goals.

REGULATORY AND PROCEDURAL OBLIGATION

This RMP satisfies regulatory or procedural obligations for several government entities. Discussed here are the obligations under Minnesota Drainage Law, Minnesota Wetland Law, and Federal Clean Water Act Law. Later, in Section V, other obligations are discussed, including The City of Blaine, Minnesota Protected Waters, and MPCA goals for the Golden Lake TMDL.

Minnesota Drainage Law

103E.715 Procedure for Repair by Petition

- Subd. 1 Repair Petition
- Subd. 2 Engineer's Repair Report
- Subd. 3 Notice of Hearing
- Subd. 4 Hearing on the Report

RCWD is the ditch authority for ACD 53-62. Governed by the statutes specified in MN Statute103E, the RCWD is given authority for managing and maintaining the public ditch system. Following is a list of goals to be incorporated into the repair of ACD 53-62.

- Convert agricultural ditch to flow-through wetlands and naturalized streams (see Appendix J)
- Minimize future ditch maintenance costs by utilizing a self-sustaining design (see Appendix J)
- Remove ditch obstructions
- Provide adequate flood relief
- Recognize future development
- Maintain hydraulic efficiency

One of the more relevant articles in Drainage Law is Minnesota Statute 103E.015, subdivision 2. This statute provides that in ordering any work affecting a public drainage system, the drainage authority "must give proper consideration to conservation of soil, water,

forests, wild animals, and related natural resources, and to other public interests affected, together with other material matters as provided by law in determining whether the project will be of public utility, benefit, or welfare." This RMP assesses the impacts of the repair alternatives on public welfare considerations including: (a) public road authority and other local governmental costs; (b) flood and stormwater management impacts within and below the RMP area; (c) impacts on public and private development costs; (d) impacts on natural resources within and adjacent to the RMP area; and (e) permitting and approval requirements that may result in the alternatives differing in the timeframe and possibility of their implementation.

Subdivision 1, Environmental and Land Use Criteria, is also very relevant to evaluating ditch effects on wetlands and other aquatic resources. This states that before establishing a drainage project, the drainage authority must consider: 1) private and public benefits and costs of the proposed drainage project; 2) the present and anticipated agricultural land acreage availability and use in the drainage project or system; 3) the present and anticipated land use within the drainage project or system; 4) flooding characteristics of property in the drainage project or system and downstream for 5-, 10-, 25-, and 50-year flood events; 5) the waters to be drained and alternative measures to conserve, allocate, and use the waters including storage and retention of drainage waters; 6) the effect on water quality of constructing the proposed drainage project; 7) fish and wildlife resources affected by the proposed drainage project; 8) shallow groundwater availability, distribution, and use in the drainage project or system; and 9) the overall environmental impact of all the above criteria.

This RMP fulfills RCWD's obligation under "103E.715 Procedure for Repair by Petition." This RMP includes all required elements of an Engineer's Repair Report and has followed the required public hearing process.

Wetland Conservation Act

The Resource Management Plan for ACD 53-62 has been structured to meet the requirements set forth in the WCA 8420.0650 for Local Comprehensive Wetland Protection and Management Plans.

8420.0650 Local Comprehensive Wetland Protection and Management Plans

- Subp. 1 General Requirements and Participation
  - Notice made at beginning of process
  - Plan is implemented by ordinance
  - TEP consulted in all Plan components
  - LGU must require equivalent or greater standards for wetland conservation
- Subp. 2 Plan Contents
  - Inventory of wetlands
  - Wetland functional assessment
  - Public values
  - Sequencing variance allowed
  - Minimum 1:1acreage replacement
  - Prescribe standards for size and location of replacement wetlands
  - Allow exemptions as long as they are not less restrictive
  - Establish high priority wetland areas

- Subp. 2a Project Notice and Appeal under Local Ordinance
- Subp. 3 Board Review and Approval

In addition, the plan meets these following two requirements. Public ditch repair impacts to Type 3, 4, 5 wetlands require mitigation under state wetland law (MN Rule 8420.0122 Subp. 2C). Only under the public ditch exemption are the impacts to all other wetland types exempt from replacement. The project is in a 50-80% area as defined by the WCA and therefore according to 8420.0650 Subp. 2 C1, "one acre of replaced wetland is required for each acre of drained or filled wetland", if there is an approved CWMP in place.

The RMP implementation will be subject to review by the BWSR every five years under a process developed by them.

The proposed plan meets WCA replacement requirements (siting of mitigation) and adheres to the following 10 additional stipulations:

1. All high quality wetland plant communities (DNR Natural Heritage Rank B/C or higher) are protected and may not be disturbed.
2. High quality upland (MLCCS-mapped natural community and with MNDNR Natural Heritage Rank B/C or higher) may not be excavated for wetland replacement credit.
3. Low quality upland may be converted to wetland for wetland impact replacement.
4. Under certain circumstances upland associated with wetland areas may be included in the mitigation. This is for natural community upland that ranks using MNDNR Natural Heritage descriptions as B/C or higher. Mitigation credit is allowed under the RMP for preservation of this upland.
5. Upland not dedicated to the WPZ can not be used for upland habitat credit in the mitigation plan.
6. A wetland delineation as well as a wetland functional assessment (MNRAM 3.0) is required for proposed action in the RMP. Water level monitoring data may be required. Guidance on requirements for water level monitoring and an acceptable protocol will be provided by the TEP.
7. Actual acreages of wetland impact and wetland replacement ratios will be calculated using site specific information and the methodology articulated in this RMP.
8. All wetland replacement for impacts must be replaced within the 53-62 RMP watershed. Replacement credits generated within the watershed may only be used in the watershed, unless authorized by the BWSR for state banking.
9. All maps and figures associated with this RMP are concept only. Actual final site conditions within the RMP will depend on approved wetland delineations and detailed property information.
10. A native vegetation buffer separating developed areas from WPZ wetlands will be required and may contain walking trails and limited stormwater infiltration BMPs.

Section 404, Clean Water Act

Under Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (Corps) regulates the discharge of dredged or fill material into waters of the United States. Any wetland impacts resulting from these activities are required to be mitigated, with full replacement of the lost functions and values of the affected wetlands

Currently, the project review and permitting associated with these regulatory functions usually occurs on a project by project basis, a process which can be lengthy and result in a cumulative incremental loss of wetlands in an area over time. Recognizing this, recent years have seen an increased emphasis on moving towards a watershed approach.

There are several components of the Ditch 53-62 RMP that align with CWA Section 404 requirements. The first is its inventory and assessment of aquatic resource in the basin. This element of the RMP is akin to the US EPA's Advanced Identification of wetlands (ADID) process, which is a program designed to provide improved awareness of the functions and values of wetlands and other waters of the U.S. in a given study area. Similar to the RMP process, the ADID process can be used to inform landowners and developers of the aquatic resources that may be unsuitable for the disposal of dredged or fill material.

The ADID process can also be used to address long-term protection and management of aquatic resources in an area, just as the RMP has identified a Wetland Preservation Zone (WPZ) to achieve a preserved corridor of wetlands, waterways, and adjacent uplands within the Ditch 53-62 basin. This second component of the RMP demonstrates a planning-level effort to avoid wetland impacts, which is fundamental to the CWA Section 404 program.

The third component of the RMP that is compatible with Section 404 is the analysis of water resource management alternatives, and the selection of a preferred water control and management alternative for the basin, based on Blaine's comprehensive planning documents. The RMP does not include an alternatives analysis for development in the basin. As detailed in the RMP Permitting Procedures, individual development proposals must evaluate both off-site and on-site alternatives that avoid and minimize wetland impacts to the maximum extent practicable.

The fourth component of the RMP that aligns with Section 404 is the establishment of compensatory wetland mitigation guidelines applicable to proposed projects within the basin. As detailed in Appendix I, the RMP's wetland mitigation guidelines are consistent with CWA Section 404 guidelines for wetland compensatory mitigation.

The RCWD, USACE, BWSR, US FWS, and US EPA have agreed upon a process for applying a CWA Section 404 framework to the Ditch 53-62 RMP. The following steps will be taken to facilitate the compatibility of the Ditch 53-62 RMP with both state and federal wetland requirements:

1) Feedback will be solicited from the US EPA regarding the compatibility of the RMP's wetland inventory and assessment process with the US EPA's Advanced Identification of wetlands (ADID) process,

2) USACE, US EPA, and US FWS comments will be incorporated into the RMP as appropriate;
3) the RMP and Draft RCWD Rule will be put out on a federal Public Notice, inviting public comments within a 30-day comment period,
4) public comments will be incorporated into the RMP and Rule as appropriate;
5) a federal administrative record will be maintained by the USACE, and
6) this administrative record, including the final RMP and RCWD rule, will be utilized in any subsequent federal permit evaluations associated with proposals within the Ditch 53-62 RMP basin.

RMP Differences From Existing State and Federal Rules

The RMP will be adopted by Rule, like other state and federal wetland regulatory guidance. The RMP improves wetland permitting over existing state and federal rules in the following ways. First, the Permit Process initiates the alternatives analysis and 'sequencing' process for avoiding impacts at early planning stages, which are often not captured by the typical federal and state approval process. Second, the WPZ and non-WPZ classification sorts wetlands into high and low priority categories for protection; preservation of the high priority wetlands will protect landscape scale function that is typically overlooked in current permitting procedures. Third, impact debits are applied to wetlands based upon wetland type, level of degradation, and overall function; penalties are imposed for proposing impacts to nondegraded and difficult to replace wetlands; this distinction is not made under current permitting procedures; penalties will be given for not locating replacement wetlands in such a way as to enhance the landscape connectivity of existing wetlands and reduce locating replacement wetlands in an isolated urban landscape. Fourth, the inseparable link between upland and wetland as parts of whole habitat complexes is required to be addressed, unlike existing rules; the RMP goes as far as providing functional replacement credit for protecting this link. Fifth, wetland replacement is required in the same subwatershed (the 53-62 subwatershed), unlike state and federal rules which have much less specific requirements (i.e. same major watershed, county or ecoregion). Sixth, use of mitigation banking credits to offset impacts within the RMP is restricted to those credits generated within the RMP; this is much more stringent than federal and state banking requirements which use region-wide banks for impacts in unrelated watersheds.

RMP Technical Analyses and Permitting Components

This section of the document provides or references the wetland inventory, function and value assessment, and prioritizing of resources necessary to meet the CWMP requirements and CWA procedures described earlier. In addition, it utilizes these data for the purpose of ditch repair alternatives comparison.

Wetland Public Values

Public Values were received on the draft RMP. An open house meeting was held. The results of the open house are summarized in Appendix K. In reviewing this information the public values are determined to be consistent with the direction of the RMP.

Wetland Functional Assessment

The purpose of wetland functional assessment was to accomplish the following:

- Identify high priority wetland resources on a watershed basis
- Provide comparative results for each of the ditch repair alternatives identified in Section II.
- Determine criteria for the RMP that maintain wetland functions
- Identify potential wetland restoration sites.

To identify high priority wetland resources, a landscape functional assessment was performed. The functional assessment methodology was developed by selecting wetland indicators and scoring protocols from the Minnesota Routine Assessment Methodology (MnRAM 3.0). All indicators and wetland functional parameters included in a full MnRAM 3.0 analysis were not conducted as part of this landscape level assessment. Functional assessment scoring methodologies and assumptions were developed and discussed at several meetings with the TEP. Appendix N documents the interagency coordination involved in this process.

The methodology and benefits of the landscape functional assessment is discussed below under Wetland Preservation Zone. The Landscape Function is a new and separate function from those listed in Table 6. Other than giving high priority for wetlands scoring high for vegetative integrity, the assessment scores for other functions listed in Table 6 were not used to determined high priority resources. However, for the ditch repair alternative comparison, the functions listed in Table 6 were used. The results are in Appendix K and also in Section III.

Table 6: Wetland Functions Analyzed in the Landscape Level Assessment to Compare Ditch Repair Alternatives

A. Maintenance of Characteristic Hydrologic Regime
B. Flood/Stormwater/Attenuation
C. Downstream Water Quality
D. Maintenance of Wetland Water Quality
E. Maintenance of Characteristic Wildlife Habitat Structure
F. Maintenance of Characteristic Amphibian Habitat
G. Maintenance of Characteristic Fish Habitat
H. Vegetative Integrity

The three ditch repair alternatives are briefly compared below:

- Existing Conditions – No ditch repair, future development not evaluated, not a foreseeable future scenario
- No Action (Alternative 1) – No ditch repair, future development evaluated.
- Feasible Repair (Alternative 2) – Limited ditch repair, future development evaluated.
- RMP (Alternative 3). – Limited ditch repair, future development evaluated, new standards applied to stormwater, higher priority wetlands and wetland mitigation

The results of comparing alternatives with respect to wetland functions was just one of the criteria used in selecting the preferred ditch repair. Section II. Provides the complete discussion of criteria used to select the preferred alternative. Summarized below are some of the factors which led to differences in wetland functions between the ditch repair alternatives.

The existing conditions functions generally rank higher than the RMP using this functional assessment methodology. Watershed land use affects several indicators as described below.

Scoring of the degree of impervious surface in the watershed was the same for all future scenarios. This in itself is a significant reason for all future scenario scores to decline over existing conditions. As such, the RMP scores are conservative and do not reflect any effect of widespread implementation of the RMP Rule, because no indicator was developed to evaluate the effect of watershed-based infiltration practices as defined in the Rule. These BMPs should in concept negate some of the impact that is reflected in the RMP alternative.

The No Action and Feasible Repair differ from the RMP in the scoring of buffer type and condition for wetlands. Current state and federal rules do not require placement of a buffer around wetlands avoided during development. The RMP was the only future scenario which scored for a buffer, but only for the WPZ wetlands. The non-WPZ wetlands were treated as though current rules apply. This provides another explanation for the RMP scores being less than existing conditions – the existing buffer condition being higher than under fully developed land use.

Wetland Preservation Zone

The Wetland Preservation Zone (WPZ) is a crucial part of the RMP. It identifies high priority wetland resources and associated habitat. Impacting wetlands in the WPZ may result in increased replacement ratios. On the other hand, wetland mitigation and banking plans that enhance the functioning of the WPZ will be given preference.

The WPZ alignment was established through development of a landscape scale wetland functional assessment method. This included certain indicators of wetland function, along with Special Features, defined in MnRAM 3.0 and regional priority resources and open space corridor alignments identified by existing local plans. GIS layers incorporated in this evaluation include:

1. High scores from the Landscape Level Assessment (a score of 7.5 to 8.0 constitutes "High" on a scale from 0 to 8)
2. High scores from the Vegetative Diversity/Integrity (wetlands with a “B/C”, “B”, “A/B” NHP natural community quality ranking)
3. Proposed Greenway Hubs and Corridors identified by Anoka Conservation District
4. Minnesota County Biological Survey (MCBS) data
5. Rare Species Locations from the MN DNR Natural Heritage Information System
6. Potential restoration sites as identified through current field work
7. Critical Habitat Sites as identified through the report: “Ecological Surveys of Rare Plants and Plant Communities in Eastern Anoka County, Minnesota”
8. Current public ditch systems alignments.

The WPZ Alignment was then placed along and between public ditch systems which intersect the wetland areas identified by this evaluation, incorporating the GIS layers listed above.

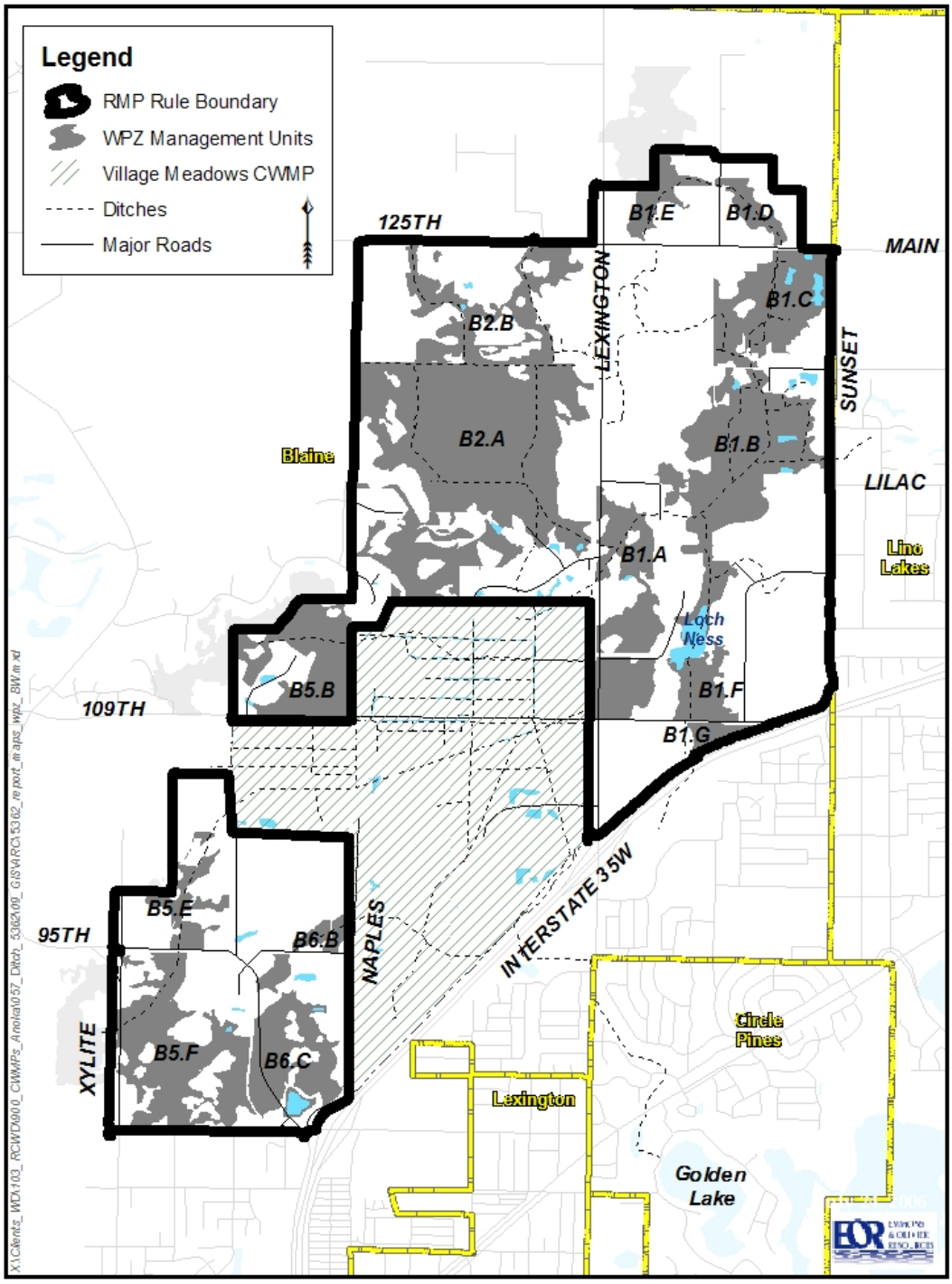
Detailed information about how the alignment of the WPZ was established is described in Appendix K or Appendix N for interagency coordination.

The WPZ concept was developed to address multiple objectives:

- First, it encompasses those priority resources that, on a watershed basis, are the focus of additional protection and enhancement for the future.
- Second, it provides a basis for watershed-based decisions on avoiding, minimizing, and mitigating adverse impacts to wetlands.
- Third, due to partially drained wetlands from the public ditches, it provides a mechanism for wetland mitigation credit while restoring wetland functions.

The WPZ for the entire RMP is made up of individual management units (Figure 10). These management units are made up of existing wetlands that fall along the alignment of the WPZ. Each of the management units has recommendations and goals for vegetative restoration, channel configuration and water levels (Appendix J).

Figure 10: RMP Wetland Preservation Zone Management Units and Rule Boundary.



The land within the RMP and WPZ is owned by many different persons and organizations. The actual boundary of the WPZ will be established based upon proposed actions on parcels which trigger permitting. Site-specific information such as a wetland delineation and a wetland functional assessment will be obtained and submitted by the applicant. That information will be used by the applicant to determine each wetland's status as either in the WPZ or out of the WPZ. The WPZ will then be shown on final plans and easements as the Wetland Preservation Area (WPA), consistent with the same area defined under the Minnesota WCA.

The geographic area to be specifically defined at the time of permitting as the WPZ shall be established as follows.

1. Any jurisdictional wetland communities contiguous with defined management units and general WPZ alignment illustrated in Figure 10.
2. Any wetland plant community scoring high for vegetative integrity using MnRAM 3.0 or most recent state approved model
3. 300' adjacent to any wetland plant community scoring high for vegetative integrity using MnRAM 3.0 or most recent state approved model.
4. Minimum of 50' of upland buffer adjacent to WPZ qualifying wetland.

The TEP will review and make a final determination on the WPZ.

For restoration of wetlands partially drained from the public ditch system, the hydrologic regime goal will be established to restore the processes of seasonal flooding and nutrient cycling to the full extent of the wetland basin (see Appendix J for management unit concept plans). In coordination with the TEP the extent of partial drainage will be determined using the scale of degradation (see Definitions) and other guidance from state and federal wetland resource managers. This wetland restoration shall be available as wetland mitigation credit to land owners of such wetland in order to offset approved wetland impacts (provided those impacts have been avoided and minimized to the greatest extent practicable) within the 53-62 RMP watershed, or the BWSR wetland banking program. That is, those landowners who would receive the benefit of wetland drainage from traditional public ditch repair shall, under the RMP, have the credit benefit (limited to the appropriate wetland enhancement and preservation credit under the joint guidelines developed in Appendix I) because of demand for wetland mitigation credit by others or their own needs. The benefit will only be realized as part of a wetland mitigation/replacement plan under Federal and State wetland rules or as market demand for eligible wetland replacement areas by others in the RMP or the BWSR banking program. This action requires the need to distinguish between public ditches and lawfully or unlawfully connected private ditches. Landowners of the public ditch system will be eligible to sell mitigation credit to the BWSR or other landowners in the watershed, provided the restoration and mitigation credit has been approved. In addition, for all private ditch maintenance, evidence must be provided to demonstrate that the private ditch is lawfully connected to the public ditch. The depth and capacity of private ditches cannot be improved with respect to the capacity of the connected public ditch.

The RMP provides disincentive for adverse impacts to the WPZ. Wetland type, level of degradation, and function are used to establish the replacement required of proposed impacts. Both direct and indirect impacts to WPZ wetlands will likely result in a higher mitigation

replacement ratio compared to non-WPZ wetlands. This is because the landscape functional assessment used to establish the WPZ is a good screening for the anticipated level of function from site-specific evaluation.

The RMP also provides for land use protection of the WPZ. At a local land use planning level, the WPZ will be protected and identified as open space by the City of Blaine Zoning (see Section V. Other Regulatory Obligations).

Sequencing

This RMP provides information for alternatives analysis that is undertaken to avoid, minimize, and mitigate impacts to wetlands. This is incorporated into the RMP Rule and permitting. The RMP requires full evaluation of off-site and on-site alternatives analysis in demonstrating the project need to be submitted with permit applications. For offsite analysis, this means demonstrating that the proposed alternative parcel and location is the least environmentally damaging feasible alternative for the action. Project proposers may choose to seek the advice of the RCWD and TEP prior to making alternative decisions on parcel selection for the proposed action. At this time, the RMP will not require proposers do this prior to the selection of off-site alternatives. However, the RCWD strongly encourages this and will provide information used to formulate the RMP, such as the MLCCS land cover data, WPZ, and recommendations on alternative locations. Not requiring review and approval of off-site alternatives analysis prior to selecting the alternative, is consistent with existing state and federal wetland rules.

Under the RMP, analysis of onsite alternatives will differ from existing state and federal rules. The Project Permitting Process provides steps which distinguish between conceptual planning alternatives analysis and detailed design alternatives analysis. Under the RMP, conceptual planning analysis is recommended prior to detailed design analysis. This distinction from existing rules can provide significant cost savings to project proposers whose concept planning requires revision in order to fully address avoidance of wetland impacts. The Project Permitting Procedures detail the information required for different stages of alternatives analysis.

During the process of avoiding, minimizing, and compensating for impacts, the priority for avoidance of impacts is related to the watershed location, quality, and function of the resource. The priority for avoidance is as follows:

1) WPZ wetlands
2) Exceptional Resource Value Wetlands outside of WPZ (as defined under WCA)
3) Critical upland wooded habitat contiguous with wooded wetlands (MLCCS map units for upland natural community or state-listed animals are known to use both the wetland and upland). Critical Upland Habitat is the upland areas immediately adjacent to wetlands that are necessary to fulfill the habitat function of the wetland.
4) Non-WPZ wetlands

Categories 1-3 trigger additional incentive to more fully explore alternatives analysis, otherwise higher replacement ratios can be anticipated (see Table 8). The priority for avoidance given above does not loosen alternatives analysis for category 4. As far as

mitigation goes, category 4 will receive scrutiny as described in existing state and federal rules. Categories 1-3 trigger higher replacement ratios if compensatory mitigation for losses to these resources is being considered.

Compensatory Wetland Mitigation Requirements

The approach to calculating wetland impact and replacement is to provide an incentive for applicants to pursue mitigation that is contiguous with high priority resource areas and a disincentive for applicants to propose impacts to these same resources. The proposed wetland credits for mitigation activities in the 53-62 RMP watershed are an acre-based currency (see Table 10). Wetland impacts are acre-based and also 'function-based'. By evaluating the wetland type, level of degradation, and function (Table 8), impact-acres are determined and the replacement ratio is set accordingly. Another aspect of the proposed system is that the wetland impacts and replacement will be based on plant community types (per MnRAM 3.0) rather than Circular 39 types.

The Project Permitting Procedures details the information required by applicants at different stages of alternatives analysis and development of compensatory mitigation plans. If the compensatory mitigation requirements are not met for the applicant's preferred on-site alternative, then the applicant will be required to redesign the project or consider purchasing wetland credits within the RMP watershed that have been approved as part of this RMP for mitigation. If there is no available mitigation credit, then the applicant will be required to redesign the project.

Wetland Impact-Acre Calculations

The term wetland impact, shall for purposes of the RMP mean 'a loss in the quantity, quality, or biological diversity of a wetland caused by draining, filling, excavating, or diverting water from a wetland,' per the WCA, or conversion an existing high functioning wetland type to some other type without equal or greater function by inundation or other means. Conversion of a wetland type is generally viewed under Corps policy as a wetland impact.

Proposed impacts to wetlands within the RMP will be evaluated using several criteria to determine the replacement ratio. These are the wetland type, level of degradation, and function. The landscape function and its affect on determining the WPZ will be of particular importance. These criteria will be used to establish the impact-acres that then go into determining the replacement ratio.

The first impact-acre criterion is risk of unsuccessful establishment based upon wetland plant community type (Table 7). This is based on the idea that certain wetland types are difficult or not feasible to create or restore and take a long time to reach full functional potential. Each of the wetland types identified by Eggers and Reed (1987) have been ranked by degree of difficulty to create or restore based upon

1. hydrologic classification;
2. and ability to reach full establishment within the regulatory timeframe (typically 5-years).

Table 7: Wetland Plant Communities Ordered from Low to High Risk of Unsuccessful Establishment

Seasonal mudflat (easiest to create)
Mixed emergent marsh, semi-permanent hydrology
Mixed emergent marsh, seasonal hydrology
Wet meadow
Wet prairie
Sedge meadow
Shrub-carr
Lowland hardwood forest
Hardwood swamp, seepage subtype
Hardwood swamp, ephemeral woodland inclusion
Tamarack swamp
Rich fen (most difficult to create)

The establishment risk factor is related to wetland type and the chances that such type can be replaced at another location within the RMP area within the typical regulatory time frame. Within the RMP area, the wetland types for hydrologic restoration are dominated by flow-through marsh systems, for the most part. Wetland establishment (creation) would thus be required to replace impacts to wetland types other than these. Doing this will raise the risk factor considerably, because wetland creation is generally less successful than restoration. The hydrologic class is also considered in setting the risk factor (flow-through, groundwater recharge, groundwater discharge, etc.), along with hydroperiod, and water chemistry. These two factors combined lead to the replacement risk order of wetlands in Table 7.

Replacement risk order is first combined with level of degradation in the impact-acre calculation. A scale of degradation has been developed to classify wetlands as degraded or nondegraded (Table 9). For impact-acre calculation, degraded is severe and moderate, and nondegraded is marginal or none. Thus, if an action would impact a non-degraded (high habitat function/vegetative integrity) forested wetland, then the impact-acres for that functional unit would be two times as much as an impact for a shallow marsh. If a proposed action would impact a degraded (low habitat function/vegetative integrity) deep marsh, the impact-acres for that functional unit would be 1.0 times the size of impact due to a lower risk factor for unsuccessful replacement. After considering these two criteria, the site-specific wetland functional assessment will be considered in establishing the final impact-acres by functional unit. High landscape function wetlands will result in higher impact-acres than those shown in Table 8. Other site-specific wetland functions will also be evaluated for setting the final impact-acres.

Table 8. Wetland Impact-Acre Determination

Existing Wetland Type	Acre-for-Acre Impact Ratio
Degraded shallow, deep marshes or open water	1.0
Non-Degraded shallow, deep marshes or open water	1.25
Degraded sedge meadow, wet meadow, or wet to mesic prairie	1.0
Non-Degraded sedge meadow, wet meadow, or wet to mesic prairie	1.5
Degraded shrub carr or alder thicket	1.0
Non-Degraded shrub carr or alder thicket	1.5
Degraded hardwood, coniferous swamp, floodplain forest, or bog	1.25
Non-Degraded hardwood, coniferous swamp, floodplain forest, or bog	2.0
Degraded seasonally flooded basin	1.0
Non-Degraded seasonally flooded basin	1.25
Note: These ratios are a minimum. Wetlands with high landscape function or in the WPZ will have a 2x multiplier to the ratio shown.	

Each wetland plant community in a wetland complex is a different wetland type for impact assessment. Each community is evaluated separately for level of degradation.

The impact-acres are related to the replacement ratio as follows. The minimum replacement ratio is 2:1. The 1:1 replacement is based upon the actual acres of impact. Only the mitigation activities identified for 1:1 replacement can satisfy the mitigation for actual acres. The impact-acres above 1:1 can be replaced by those same activities and also using functional replacement activities (see Table 10). So, a non-degraded shrub-carr would at a minimum have a 2.5:1 replacement. Using the full functional assessment data, the ratio may be increased, but could never be decreased. In Appendix I is a hypothetical land to demonstrate calculation of impact-acres, replacement ratios, and mitigation credit.

Basic Stipulations on Replacement
As listed on page 30, the following stipulations apply to selection of mitigation sites.

1. All high quality wetland plant communities (DNR Natural Heritage Rank B/C or higher) are protected and may not be disturbed.
2. High quality upland (MLCCS-mapped natural community and with MNDNR Natural Heritage Rank B/C or higher) may not be used for the creation of new wetland credit.
3. Low quality upland may be converted to wetland for wetland impact replacement.
4. Under certain circumstances upland associated with wetland may be included in the mitigation plan for credit above 1:1. This is for natural community upland that ranks B/C or higher using MNDNR Natural Heritage descriptions. Mitigation credit is allowed under the RMP for preservation of this upland.
5. Upland not dedicated to the WPZ can not be used for upland habitat credit in the mitigation plan.
6. A wetland delineation as well as a wetland functional assessment (using MNRAM 3.0) is required for proposed action in the RMP. Water level monitoring data may be required. Guidance on requirements for water level monitoring and an acceptable protocol will be provided by the TEP.

7. Actual acreages of wetland impact and wetland replacement ratios will be calculated using site specific information and the methodology articulated in this RMP.
8. All wetland replacement for impacts must be replaced within the 53-62 RMP watershed. Replacement credits generated within the watershed may only be used in the watershed, unless authorized by the BWSR for state banking.
9. All maps and figures associated with this RMP are concept only. Actual final site conditions within the RMP will depend on approved wetland delineations and detailed property information.
10. A native vegetation buffer separating developed areas from WPZ wetlands will be required and may contain walking trails and limited stormwater infiltration BMPs.

Restoration of Partially Drained Wetlands

The credit for proposing to restore partially drained wetlands is based upon the current level of degradation of the partially drained wetland. The two wetland indicators of function used in MNRAM 3.0, outlet condition and vegetative quality, are used to determine the level of degradation (Table 9 and Definitions). At the time of a proposed restoration of a partially drained wetland, the scale of degradation will be applied to help establish the credit ratio. Applicants should also be aware that regional criteria used by the USACE and guidance on partially drained wetlands in the WCA may also be considered by permit reviewers to make a final determination of the partially drained wetland eligibility for replacement credit. In addition, the hydrologic regime goal for the partially drained wetland proposed for restoration will be guided by the analysis provided in Appendix J. The applicant can propose the goal, but review and approval by the RCWD and TEP is required.

Table 9. Scale of Wetland Degradation using MNRAM 3.0 (L=low, M=med, H=high)

Scale of Degradation	MnRAM Score (outlet condition/vegetative quality)
Severe	L/L or M/L
Moderate	L/M or M/M
Marginal	L/H or H/L
None	M/H or H/M or H/H

Infiltration BMPs

Stormwater management is a priority for the RMP because it affects hydrologic regime of wetlands. Use of infiltration BMPs is not only required under rule but these features may be used for wetland mitigation credits above the 1:1 requirements, if they meet permit conditions and criteria in Table 14. This mitigation activity will also only be approved if habitat functional replacement is also proposed (see Table 14). The basis of this mitigation activity is that properly designed infiltration best management practices (BMPs) can provide some functional equivalency to water quality and flood attenuation functions. By capturing and infiltrating stormwater, the volume of surface runoff containing pollutants can be reduced.

Mitigation credits for infiltration BMPs are calculated on a volume basis. Every acre-foot of infiltration storage provided by an applicant receives one mitigation credit above the 1:1 replacement. Sizing and design criteria for the infiltration features are detailed in the Rule

that accompanies this Plan. Infiltration features are based upon the 2-year event, or a 2.8-inch rainfall, because smaller storms capture a higher level of pollutants. They are also required to be set above the seasonal high water table. Infiltration BMPs provide significant benefit for the following wetland functions:

- Maintenance of Characteristic Hydrologic Regime
- Flood/Stormwater Attenuation
- Maintenance of Downstream Water Quality
- Maintenance of Wetland Water Quality

Under the RMP, it will be required that the acre-feet of storage for the impacted wetland and infiltration BMPs (functional mitigation sites) will need to be compared. The infiltration BMPs will need to match the storage of the impacted wetland. It is anticipated that site design will integrate multiple small contributing area infiltration BMPs. The total storage of all infiltration BMPs will be used in this comparison.

Only infiltration features that are vegetated with native species are eligible for RMP credit above the 1:1 requirement (current Corps Regulatory policy does not provide credit for infiltration BMPs). In addition to the aforementioned functional replacement by infiltration features, native species provide some habitat value for wildlife species, depending on the watershed basin location of the infiltration BMP. Infiltration features such as pervious pavement, infiltration trenches and underground chambers are not eligible for wetland credit.

Calculating Mitigation Credit and Allowable Mitigation Activities

Mitigation credit will be allowed for a variety of activities intended to compensate for loss of wetland area and functions (Table 14, Appendix I). The WCA and Section 404 provide very specific methods for how wetland mitigation credit can be calculated. A comparison of RMP, WCA, and Section 404 activities is in Table 14, Appendix I. All variations between the RMP mitigation activities and WCA or Section 404 are agreed to by the BWSR and USACE, but only for the geographic area of the 53-62 RMP.

The RMP shows preferences for mitigation activities by varying the credit ratio. A credit ratio of one means that each acre of activity satisfies an acre of required replacement. For many activities the credit ratio is less than one. In addition, mitigation location that is outside the WPZ will receive half credit compared to the credit ratios shown in Table 10. Mitigation locations contiguous with the WPZ will always result in high landscape function.

Table 10 is a summary of activities and ratios applicable to the 53-62 RMP watershed. This table is consistent with Table 14 in Appendix I. The table was designed to quickly distinguish mitigation allowable for 1:1 impact-acre replacement and for functional replacement.

Table 10: Mitigation Credit Ratios for Activities Within the RMP Watershed.

Replacement Method	Replacement Credit Ratio
1. Wetland Impact-Acre Replacement (NWC) (for impact acres)	
Hydrologic and vegetative restoration of partially drained marginally degraded wetlands	0.25
Hydrologic and vegetative restoration of partially drained moderately degraded wetlands	0.5
Hydrologic and vegetative restoration of partially drained severely degraded wetlands	0.75
Wetland establishment (creation) in nonnative vegetated upland or restoration of effectively drained, former wetland	1
Farmed wetlands (WCA guidance) vegetation restoration	Up to 1
2. Wetland Function Replacement (PVC) (for impact above 1:1 acre replacement)	
a. Habitat Function Replacement	
Upland buffer contiguous with wetland	Up to .25
Upland habitat area contiguous with WPZ wetland	Up to 1
Vegetation restoration of existing invasive or exotic dominated wetland in the WPZ	Up to 1
Preservation of high quality wetlands (under demonstrable threat)	Up to 0.5
Preservation of wetlands having "exceptional natural resource values" (WCA guidance; case by case approval under Section 404)	0.5
b. Hydrologic Function Replacement (maximum 50% of Functional Replacement; case by case approval under Section 404)	
Stormwater infiltration BMP: (1 ac-ft = 1 acre credit)	1
Note: Replacement not protected by the WPZ receives 50% credit. Minimum of 1:1 impact-acre replacement and minimum 2:1 function replacement.	

Wetland Banking

The RCWD may administrate on behalf of individual banking participants a wetland banking program for the purpose of credit and debit transactions within the RMP area. The bank will conform to MN Rule 8420.0730 Subpart 1 and comply with parts 8420.0700 to 8420.0760.. The Corps will also be involved the wetland banking process. Details of this potential banking program have not yet been finalized. However, the following will be standards for any wetland bank transactions within the RMP.

1. The credits generated within the RMP can be used to replace impacts outside of the RMP. However, if credits are used outside of the RMP, 8420 Guidance in WCA will apply.
2. Credits available outside of the RMP can not be used as compensation for impacts within the RMP.
3. Applicants must first demonstrate that they are unable to replace wetland impacts within their own development before utilizing credits in the bank.
4. Only the wetland credits generated by successful restoration of partially drained ditched wetlands and habit function within the WPZ are eligible for wetland banking credit.

5. Surplus credits may be used for some other developer incentive program such as density credits or park dedication.

In-kind Replacement

The applicant's replacement plan should balance acreages of wetland types for existing conditions and proposed. Exceptions will be given if a public ditch has caused a wetland to be effectively drained or highly degraded. In this case, the applicant could vary from standard in-kind replacement if the activity is restorative in nature and establishes higher functioning pre-drainage wetland types. This can be accomplished by blocking ditches or managing water levels to create a more natural hydrologic regime. Excavation is not an acceptable means to restoring wetlands to a pre-drainage condition.

Replacement Site Performance Standards

All compensatory wetland mitigation activities within the RMP that are eligible for wetland credit are subject to performance standards. First, all areas identified on the replacement plan to be wetland must meet the three jurisdictional wetland criteria for hydrology, vegetation and soils as identified in the 1987 Manual. In addition, each individual plant community proposed must be managed to meet or exceed the "high quality" standards specified for each distinct wetland plant community specified in the Minnesota Routine Assessment Methodology for Evaluating Wetland Functions version 3.0 (MNRAM 3.0), or as otherwise established under conditions of the wetland permit. This means that during the monitoring period all invasive and exotic species are monitored for and all populations are treated with a zero tolerance standard for % cover.

Any uplands, including the buffer, in the Wetland Preservation Zone must be managed for zero tolerance of invasive and exotic species and a goal for the requirements as specified in the Minnesota Land Cover Classification System (MLCCS) for high quality plant communities. Standards of A or B as specified in the MLCCS manual v 5.4 will be the goal for all natural upland communities. This will require initial removal of invasive or undesirable species, and a monitoring and maintenance plan to ensure target plant communities are attained.

Stormwater infiltration features proposed for replacement credit or as part of the volume standard established by rule, must also meet the minimum design standards specified in the permit application. During the monitoring period, data will be required to ensure infiltration features are functioning and periodic maintenance will be necessary to ensure vegetated features are kept weed-free. Permanent maintenance covenants will be required. Design standards for the infiltration features are in the RMP Rule.

WPZ Wetland Management

One of the wetland characteristics altered by the ditch system is the natural hydrologic regime, including seasonal, fluctuating flooding patterns. The benefits of natural fluctuations for water quality and quantity management include storage of flood water and nutrient uptake and storage. In re-establishing hydrologic regimes of partially drained wetlands, fluctuation

would be anticipated for spring flood conditions as well as the 100-year flood event. The ecological benefits of restoring natural fluctuation are many, including provision of detrital matter for food chain productivity and enabling amphibian species with different water levels needs.

The hydroperiod, the seasonal pattern of water levels in a wetland, is characterized by the flood duration (how long) and flood frequency (how often). Wetland hydroperiod will be a primary consideration in decisions on repair/restoration of the ditch/connected wetland system. The goal will be to reestablish a natural cycle that takes advantage of the lost nutrient and water storage capacity of the wetlands from drainage.

The WPZ wetlands are primarily an interconnected flow-through system. As a system, the wetlands will not be restored or managed for the system to serve as a regional stormwater storage facility for land uses within the watershed. However, the characteristics of the upstream contributing drainage area will be factored in. The RMP Rule intends to limit runoff volumes such that the WPZ wetland system can be sustained in a natural hydrologic regime. This can not be considered to be equivalent to a presettlement condition because the 53-62 watershed will ultimately reach its fully developed condition. The wetlands can at best be managed to sustain a level of function that is agreed to by the TEP is establishing the hydrologic regime goals for restoration.

Created, restored and enhanced wetlands within the WPZ's shall abide by the following guidelines.

1. No areas within existing wetlands shall create extensive open water habitat types exceeding 5 feet in depth during normal growing season periods. Intermixed open water and emergent habitats are more typical of historic wetland conditions. For Type 3 wetlands, spring seasonal water depth should not exceed 3 feet
2. No finished slopes within the wetland area shall exceed 10H:1V.
3. All disturbed areas both upland and wetland shall be restored to native plant communities by seeding and planting after soil-disturbing activities.
4. Existing hydric soils will be salvaged and reclaimed in areas such as creation sites where regrading is occurring.
5. All wetland mitigation requirements will be adhered to as specified in wetland permits.
6. Grading activities within the WPZ shall commence after the ground is frozen to its average winter frost depth and end prior to the initiation of thawing.

Appendix F provides more detailed information related to the management and design of mitigation areas within the WPZ.

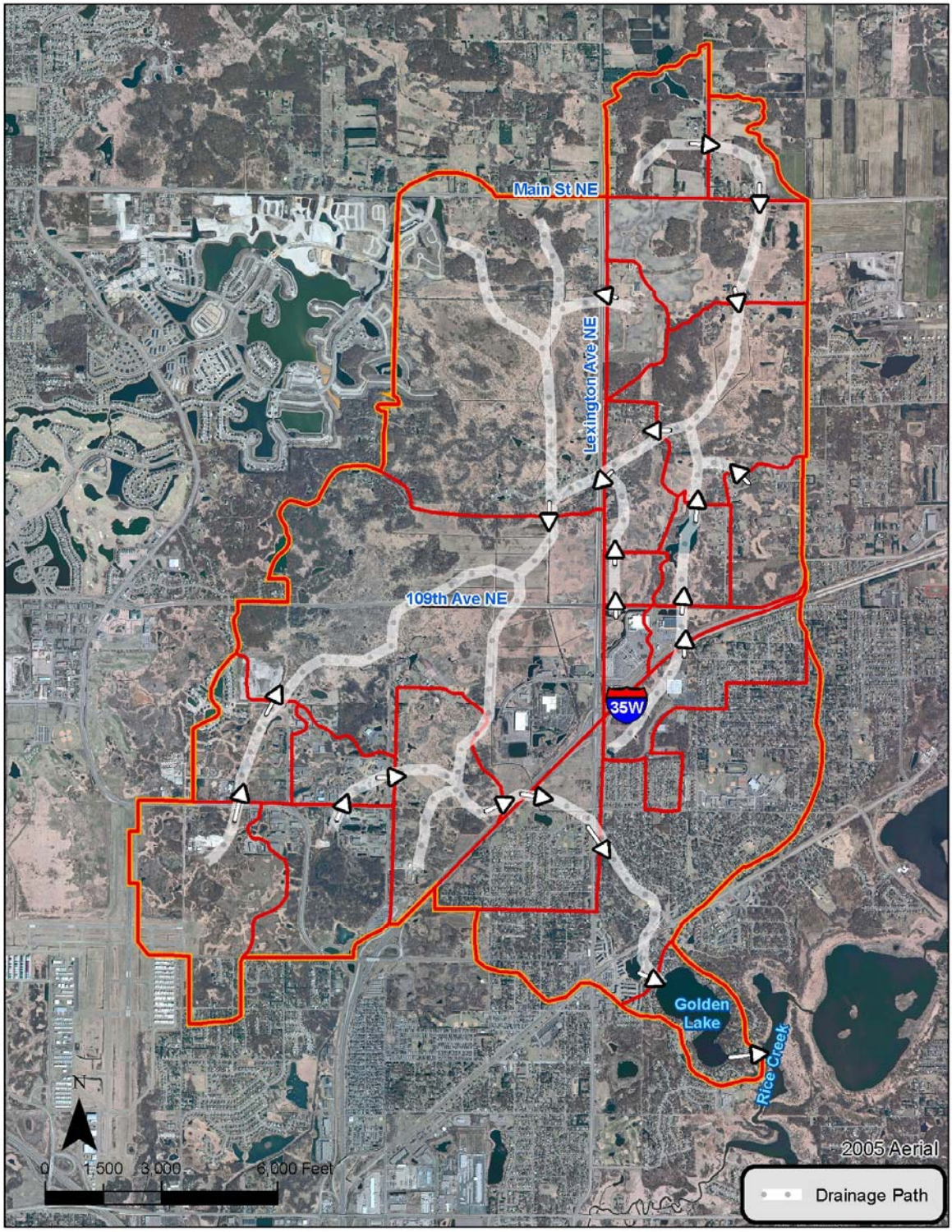
Stormwater Conveyance

Stormwater conveyance is currently being provided by ditches. Converting the existing ditch channel profiles to allow overbank flooding will increase the interaction of the in-stream flow with the floodplain and will allow settling, storage, and recycling of in-stream nutrients in channel and on the floodplain. Additionally, the meandered channel and wetlands will have more benthic, or stream bottom, surface area, which will improve water quality. Wetland functions enhanced by these activities include:

- Maintenance of Downstream Water Quality
- Maintenance of Wetland Water Quality
- Maintenance of Characteristic Wildlife Habitat Structure
- Maintenance of Characteristic Fish Habitat

In general the RMP stormwater conveyance network will follow the same alignment of the current public ditch system. Existing culvert crossings will be utilized to the greatest extent possible under the RMP. The stormwater conveyance network illustrated in Figure 11 provides the guidance for how water conveyance will be managed under the RMP.

Figure 11: RMP Subwatershed Surface Water Flow Network.



Establishing the RMP under Rule

Rule M was adopted by the RCWD Board on January 28, 2004. This Rule was written to specifically address development design standards in the Village Meadows CWMP. Rule M provides details on both development standards that must be followed and the required review process. Elements included in Rule M provide standards for surface water management, BMPs, buffers, and Wetland Preservation Areas.

In this RMP, a new rule, with similar provisions to Rule M, will be established to include the entire geographic area covered by this RMP. Figure 10 illustrates the geographic area covered by the RMP Rule.

The RMP Rule will address watershed runoff. Applicants will be required to incorporate ponding, swales, shared parking, infiltration areas, and other low-impact development techniques to minimize runoff and indirect impacts to aquatic resources, the WPZ, and significant mitigation requirements. Water resource best management practices (BMPs) will also be necessary to improve water quality and control runoff volume. The Rule will also require all applicants to field-verify all ditches mapped in the RMP. If the applicant is proposing restoration of ditched wetland in the WPZ then the scale of degradation will be required to determine the level of drainage and potential mitigation credit. The RMP Rule will also identify that future maintenance and repair of the public ditch system will comply with restrictions placed on mitigation wetlands.

Because of the unique position of the RCWD as a regional LGU (for compliance with rules affecting surface water management and wetlands), the guidance included in the RMP will be implemented through the formation of rules. These rules and this framework are in no way intended to substitute for other local, state, and federal permits.

Project Permitting Procedures

The RMP identifies priority resources, sequencing guidance, and opportunities for mitigation credit. As a result, delays are not expected in the permitting process from incomplete or inconsistent applications. The RCWD implementing the WCA, the Army Corps of Engineers implementing Section 404 of the Clean Water Act, the Minnesota Pollution Control Agency issuing Section 401 Water Quality Certifications, and the Minnesota Department of Natural Resources administering Public Waters protection all have regulatory authority over wetlands within the RMP. The RMP has been developed with the input of each of these regulatory bodies. Because of the upfront participation and implementation of the CWA Section 404 framework, this RMP provides better defined expectations for alternatives analysis, review, and mitigation.

Wetland Permitting under the Resource Management Plan

This RMP provides procedures for wetland permit review. This RMP does not substitute for permit applications. This RMP should provide a vehicle to avoid delays in the permit review process, but cannot guarantee any specific timeframes other than those specified under current state and federal rules for permitting. The contents of this RMP and the supporting

database of wetland information are intended to provide for the permit reviewers a greater knowledge base for making sound decisions on actions, impacts, and mitigation that would otherwise not be available, particularly for addressing cumulative impacts. This procedure is to be followed by the TEP to meet the RMP Rule, as well as state and federal wetland rules.

This section of the RMP is also written for those considering actions which have the potential to impact aquatic resources. The procedures provided here, if followed, should allow permit review to occur in a timely fashion and without requests for additional applicant information. Permitting procedures require at least two alternative conceptual plans to determine that which has the least impact on aquatic resources, before more detailed design and mitigation planning can proceed. Related to this, applicants may be required to provide a written statement along with preliminary plan submittals to the City of Blaine that states the RCWD and the Corps has completed its review of at least two alternative conceptual plans.

All applicants are required to review the Sequencing requirements described earlier in this plan.

Both wetland permits and the RCWD permits (inclusive of the proposed RMP Rule) will require maintenance and monitoring conditions consistent with the RMP goals for wetland functions. These permits will be enforced following all existing federal and state laws for such permits. There is no obligation by the RCWD for long-term management of wetlands beyond the terms of permits. All applicants are required to review other sections of the RMP for more information on management and monitoring.

RMP Permitting Procedures

All landowners considering actions which may affect aquatic and other high priority resources in the 53-62 RMP watershed should review the permitting procedures. Landowners are advised to work with the RCWD and the Corps to develop actions which do not impact resources and thus do not require wetland impact and mitigation permitting.

The RCWD will maintain an interagency wetland communication to inform the TEP, including the Corps, of all parties considering land alteration activities covered under the RMP Rule. The RCWD currently has an administrative process whereby the interagency wetland TEP meets semi-monthly to review wetland permit applications. This process will be continued and include interagency notification beginning with Step 1.

The following is the protocol that RCWD will use to permit development projects within the RMP. This documented protocol is intended to avoid agency confusion and clarify applicant expectations. The RCWD will be developing a Fact Sheet on Wetland Permitting under the RMP, provide workshops for landowners, planners, and professionals, and widely distribute the information to government agencies in the 53-62 RMP watershed. These steps are intended to guide the applicant through more structured and detailed alternatives analysis, as defined in state and federal rules, for avoiding, minimizing, and compensating for potential wetland impacts. In practice, state and federal permit review tends to lack an administrative structure for early off-site and conceptual planning on-site alternatives analysis. The intent of the RMP procedures is to provide this structure.

Step 1: Data Collection for Off-site Alternatives Analysis

Potential applicants are advised to contact the watershed district to obtain existing data on wetlands and other natural resources, the location of all high priority resources in the 53-62 RMP watershed, fact sheets on low impact development design, and any other information which may be beneficial to early offsite and conceptual planning alternatives development. Potential applicants are strongly encouraged to discuss alternative properties for the proposed action prior to making the property decision. During final permit review, project purpose and need and discussion of at least two off-site alternatives will be required. Proposals will need to demonstrate that the selected alternative is least damaging to aquatic resources. Off-site analysis should include comparison of differences in zoning and feasibility of providing variances to avoid impacts.

Verification of any ditches on alternative properties should be conducted at this time. The depth and capacity of private ditches cannot be improved with respect to the capacity of the connected public ditch. Private ditches within the 53-62 drainage area are assumed to be lawfully connected. For all private ditch maintenance, evidence must be provided to demonstrate that the ditch is lawfully connected to the public ditch.

Step 2: On-site Alternatives Review

Applicants are advised to discuss and review conceptual plans with the RCWD and Corps for actions which may impact aquatic and high priority resources. The locations of resources will be provided by the RCWD to the applicant. The RCWD natural resource inventory (NRI) is quite complete; however the boundaries do not substitute for the level of detail obtained from field delineation. Field delineations are not be required to be completed in Step 2. The RCWD recommends review of conceptual plans as part of permitting. Alternatives to avoid, minimize, and compensate for impacts, should be considered at this time. The concept plan which best avoids and minimizes impacts should be considered the preferred alternative. The RCWD will make a preliminary recommendation as to the preferred alternative, but this does not substitute for final permit decisions, should an applicant choose to submit a permit for wetland impacts and mitigation approval.

Alternative conceptual plans will include at least the following actions which may impact wetlands.

a. Variance to local land use ordinances and zoning, if such zoning is incompatible with resource avoidance: lot setbacks, lot size, building heights, building density
b. Reduced scope of action
c. Low impact development (LID) stormwater design
d. Integrated architecture and stormwater plan
e. Road circulation plan
f. Road widths
g. Landscaping design

No engineering plans are necessary during Step 2. A preliminary concept plan can be prepared that demonstrates which alternatives have been considered and which is least damaging alternative. The applicant may request TEP review at this point. If not now, the

TEP will review conceptual alternatives analysis if an applicant chooses to propose wetland impacts which must be mitigated through wetland permitting. Various alternative actions should be discussed, and changes to the preliminary concept plan should lead towards a more streamlined permit review if wetland impacts and mitigation are proposed. At this point changes to the preliminary concept may result in a plan without the potential to impact wetlands. This does not constitute an exemption, but suggests that if the final design is consistent, then no impacts or mitigation may occur.

Potential applicants should submit at least two concept alternatives (site sketches) demonstrating avoidance of wetland impacts for each item a-g. The RCWD and Corps will review if requested, site sketches for adequacy in avoiding wetland impacts. If a determination is made for additional avoidance measures then the applicant will be required to develop additional alternatives for review at the time of application submittal.

Step 3: Preliminary Design Review

This step shall only be initiated after Step 2, and the most feasible concept plan alternative to avoid wetland impacts has been identified. Step 3 provides more detail to Step 2. Potential applicants are required in Step 3 to use the following information to further develop proposed actions and measures to avoid impacts.

- Wetland Delineation Report consistent with all applicable state and federal rules, as well as hydrologic monitoring data (if required per guidance in Appendix I) and plant community mapping and ranking consistent with the plant community key in MnRAM 3.0 or other state approved model.
- Soil survey and borings
- Updated private ditch survey, if applicable
- Threatened and endangered species survey, when requested by the RCWD

The applicant shall use this information to revise the conceptual site plan for further avoidance and minimization of impacts. If applicants anticipate unavoidable impacts at this time, the permit will require complete description of at least two alternatives that avoid impacts, based upon the new information in Step 3. The applicant may request review by the TEP and Corps of these alternatives prior to making decisions on alternative actions. If a permit for impacts and mitigation is prepared, this information will be used in a discussion with the watershed district and all relevant regulatory staff from state and federal agencies to make a determination on whether alternative actions have been fully considered.

Step 4: Applicant Development Design

Using the site specific information and all earlier comments provided by RCWD, TEP and the Corps, the applicant can create a site development plan in accordance with the Rule and other applicable permitting requirements. The applicant shall prepare the following documents:

- Site development plan in accordance with the RMP Rule, including stormwater management plan (based upon the approved concept plan from Step 2)
- Complete full wetland functional assessment for existing and post project conditions for all wetlands on the site
- Completed JPN and replacement plan (compensatory mitigation plan)

- Completed RCWD permit application
- Completed SWPPP application

Step 5: WCA and CWA Permit Review

Once RCWD receives all required information, it will be sent to the TEP and USACE project manager and others required to receive a copy for review and comment. RCWD engineers will prepare an Engineers Report and make a recommendation to the RCWD Board. The Board will consider all comments received from the TEP findings before acting on a permit.

Step 6: Construction

Following the receipt of all applicable permits, the applicant may schedule a preconstruction meeting with the RCWD Inspector. Following that meeting, construction may begin. Periodic inspection by RCWD staff will be allowed by applicant.

Step 7: Post-Construction

Following completion of site grading activities, the applicant shall submit an as-built grading plan for the entire site including the WPZ. If wetland impacts and replacement occurred on the site, the applicant shall submit annual wetland Monitoring Reports for the WCA specified period of 5 years.

Permitting Coordination on Minnesota Department of Transportation Projects

The Minnesota Department of Transportation is the WCA LGU for wetland impacts within its right-of-way. MnDOT projects that propose to disturb wetlands within their ROW will continue to apply the wetland mitigation standards found in WCA, not the wetland mitigation standards specified in the RMP Rule, unless it elects to apply the RMP Rule. All other Rules adopted by RCWD will continue to apply for MnDOT projects within the District boundary.

V. RMP Discussion of Other Regulatory Obligations

This RMP fulfills some very specific regulatory requirements specified in the Minnesota Drainage Law, Minnesota Wetland Conservation Act and Section 404. In addition to those regulations there are other government agencies with jurisdiction in the RMP.

Public Waters

Public waters are defined in Minnesota Statute 103G.005 and include lakes, wetlands, and watercourses of a certain size having certain characteristics over which DNR Waters has regulatory jurisdiction. Public Waters Inventory (PWI) maps are county-scale maps showing the general location of the public waters and public waters wetlands, but the regulatory boundary of these waters and wetlands is the ordinary high water level normally determined in the field**.**

There are many waters identified on the DNR Public Waters Inventory (PWI) located within the boundaries of this RMP. Any potential impacts to Public Waters, either by ditch repair activity or by individual development, will require review by the DNR. ACD 53-62 is a public ditch and is not identified on the PWI.

The following table identifies each of the Public Waters that occur within the ACD 53-62 RMP. The acres of each have been estimated using DNR interpreted basin boundaries. Actual acreage of each basin requires individual analysis by the DNR regional hydrologist. Memos included in the Technical Supplement detail the process used in determining PWIs for the RMP area. Figure 6 in Section I of this report illustrates the location of each PWI.

Table 11: PWI Basins within Planning Area.

PWI ID	PWI Acres	53-62 Ditch(es) Potentially Affecting Basin
577W	78.9	Branch 2,3, Private
578W	9.4	Branch 2
579W	4.9	Branch 1
580W	142.0	None
581W	24.7	None
582W	22.7	Lateral 1 Branch 5
583W	56.5	None
584P	4.3	Lateral 1 Branch 1
585P (Lochness Lake)	42.7	Lateral 1 Branch 1
586W	14.4	Lateral 1 Branch 1
588W	11.0	None
589W	35.7	ACD 32, ACD 9
590W	17.8	None
593W	37.1	None
594W	36.8	ACD 9
705W	3.5	Private
706W	26.2	ACD 9

PWI ID	PWI Acres	53-62 Ditch(es) Potentially Affecting Basin
707W	29.6	None
708W	8.8	None

Section 401, Water Quality Certification
According to the federal Clean Water Act, applicants for a federal permit, such as Section 404 permits, for activities which may result a discharge must first obtain a Section 401 water quality certification. A Section 401 water quality certification is granted if the applicant demonstrates that an activity, such as discharge of dredged or fill materials, will not violate Minnesota's water quality standards or result in adverse long-term or short-term impacts on water quality. Such impacts can be direct or cumulative with other indirect impacts.

Minnesota's water quality standards are comprised of four parts:

1. Beneficial use designations
2. Numerical standards and criteria
3. Narrative standards
4. Non-degradation policy

In addition, greater protection is given to a category of waters listed as Outstanding Resource Value Waters (ORVW). These waters have received this designation because of their exceptional recreational, cultural, aesthetic, or scientific resource value.

The MPCA considers the following when evaluating Section 401 certification applications:

1. Compliance: Applicants must comply with the Clean Water Act and state water quality standards and rules.
2. Fills, drainage, excavation or inundation of wetlands: All wetlands are included in the definition of waters of the state and thus are protected by water quality standards.

If a 404 individual permit is warranted, the Corps incorporates this information into a public notice, which also serves as the notice for the Section 401 water quality certification. Any conditions required to meet water quality standards included in the Section 401 water quality certification become conditions of the Section 404 permit. If the MPCA denies the Section 401 water quality certification, the Corps must then deny the Section 404 permit.

In the 2001, MPCA eliminated the staffing required to operate the 401 certification program. Due to this staff reduction, the MPCA waives its 401 authority in most cases.

Stormwater - NPDES
A 1987 amendment to the federal Clean Water Act required implementation of a comprehensive national program to address stormwater runoff. Stormwater regulations are part of the National Pollutant Discharge Elimination System (NPDES) permit program and the State of Minnesota also regulates the disposal of stormwater by a State Disposal System (SDS) permit. The Minnesota Pollution Control Agency (MPCA) administers both NPDES and SDS permits and issues combined NPDES/SDS stormwater permits.

Stormwater permits require the control of polluted discharges and applicants are required to develop stormwater pollution prevention plans to address their stormwater discharges. Each

applicant determines the appropriate pollution prevention practices or "best management practices" to minimize pollution for their specific site. In addition to the NPDES/SDS permit, the MPCA may require additional permits depending on the type and extent of the proposed activity.

City of Blaine

Local permits for activities such as excavation and building are required by the City of Blaine. Applicants may be required to include a written statement of conceptual approval by the RCWD when submitting plans for preliminary approval by the City. The planning Department oversees all land development within the City and prepares and implements the Comprehensive Municipal Plan which guides land use, zoning, sewer extension, transportation, and community facility improvements or anticipated changes. The WPZ area will be formally incorporated into the City planning process and Open Space Plan.

In Resolution 01-88, the City of Blaine wished to implement an Open Space Plan for the City with the goal of acquiring significant natural areas for preservation. In order to accomplish this goal the City established a Natural Resources Conservation Board. This initiative was the result of the bond referendum passed in November of 2000 that funded the preservation of significant natural areas and trail corridors.

Other Regional Obligations

There have been many local and regional efforts with the focus of preserving and enhancing natural resources within the RMP area. Entities such as the City of Blaine, Anoka Conservation District, and the Metropolitan Council have all undertaken planning efforts in this area to help guide policy and develop mechanisms to protect valuable natural resources.

Specific goals related to natural resource conservation are as follows:

- Preserve all wetland functions
- Enhance ecological integrity and wildlife habitat
- Protect high quality natural resources
- Preserve / protect open space
- Improve water quality in Golden Lake under the TMDL standards

Many local and regional planning efforts have preceded the effort to produce this RMP. The Metropolitan Council's 2030 Regional Development Framework (RDF), adopted on January 14, 2004, clearly articulates goals and policies consistent with the RMP. One of the four goals of the RDF is identified as "Preserving vital natural resources and resources for future generations". Policy #4 is directed at working with local and regional partners to reclaim, conserve and enhance the region's vital natural resources. Specific strategies identified in the policy include integration of natural-resource conservation strategies in planning efforts, protecting regionally important natural resources, and working to preserve the region's water resources.

Other local efforts conducted by the Anoka Conservation District and the City of Blaine Park and Open Space Committee have provided valuable resource and planning information for this effort.

Environmental Review

The Minnesota Environmental Policy Act of 1973 established a formal process for reviewing the environmental impacts of major actions that have the potential for 'significant environmental effects'. Not all projects require environmental review; it is determined by the nature, size and location of a project. The Environmental Quality Board (EQB) adopted a detailed set of rules for the environmental review process. If environmental review is required under these rules, the Responsible Government Unit (RGU) works with the developer to complete one or both of the following documents:

1. **Environmental Assessment Worksheet (EAW):** A screening tool to determine whether a full environmental impact statement is needed. The worksheet is a six-page questionnaire about the project's environmental setting, the potential for environmental harm and plans to reduce the harm.
2. **Environmental Impact Statement**: An in-depth analysis used for major development projects that will significantly change the environment. The statement covers social and economic influences, as well as environmental impact, and looks at alternate ways to proceed with the project.

EISs are mandatory for projects whose nature, size, or location makes it inevitable that there is the potential for significant environmental effects. When not mandatory, case-by case decisions on the need for an EIS are based on the EAW, which may be prepared for two reasons: the EAW is triggered by mandatory categories in the rules; or the EAW are ordered by a governmental unit either on their own initiative or as a result of a citizen petition. Chapter 4410.4300 of the Minnesota Rules identifies actions that automatically trigger the completion of an Environmental Assessment Worksheet. The following Subparts of Chapter 4410.4300 outlines activities within the RMP area that may trigger an EAW:

- Subp. 12. Nonmetallic mineral mining.
- Subp. 14. Industrial, commercial, and institutional
- Subp. 27. Wetlands and protected waters.
- Subp. 36. Land use conversion, including golf courses.

Golden Lake TMDL Plan Implementation

Another regulatory framework for the 53-62 CWMP area is the Golden Lake TMDL. The Environmental Protection Agency, through the Minnesota Pollution Control Agency (MPCA), funded a total maximum daily load (TMDL) study for this watershed, which comprises the majority of the drainage area into Golden Lake. Golden Lake, the downstream receiving waterbody of ACD 53-62, was listed on the MPCA 303(d) list of impaired waters in 2002 for excess nutrients. The nutrient of primary concern is phosphorus (TP).

Standards for stormwater phosphorus reduction are being considered for adoption by Rule. The purpose is to address nutrient loading in the watershed as part of the TMDL goals.

The goal of the TMDL study is to determine the amount of phosphorus Golden Lake can receive (assimilative capacity) and still meet the MPCA TP criteria of 60 ppb. Currently, the TP concentration of the lake is 89 ppb and the watershed TP load entering the lake is 99 kg. Figure 12 summarizes how land cover will change under future development scenarios. To

estimate the assimilative capacity of the lake, the in-lake water quality model BATHTUB was used. Based on the results of the BATHTUB model, in order to reach the in-lake water quality goal of 60 ppb, the total annual phosphorus load from the watershed to the lake under current conditions must not exceed 77 kg. Under existing land use and land cover conditions; the total phosphorus load to the lake is 99 kg (Figure 11), meaning the total load needs to be reduced by 22% to meet the TMDL goal. The model was also used to predict the 2020 in-lake water quality conditions if development proceeded according to 2020 land use plans, without the use of BMPs in the watershed. Under the future 2020 Met Council land use plans without the RMP in place, the annual phosphorus loads to the lake would increase to 160 kg (Figure 12) meaning that a 52% reduction would need to occur in order to meet the TMDL goal.

Figure 12: Land Cover Summary used for TMDL

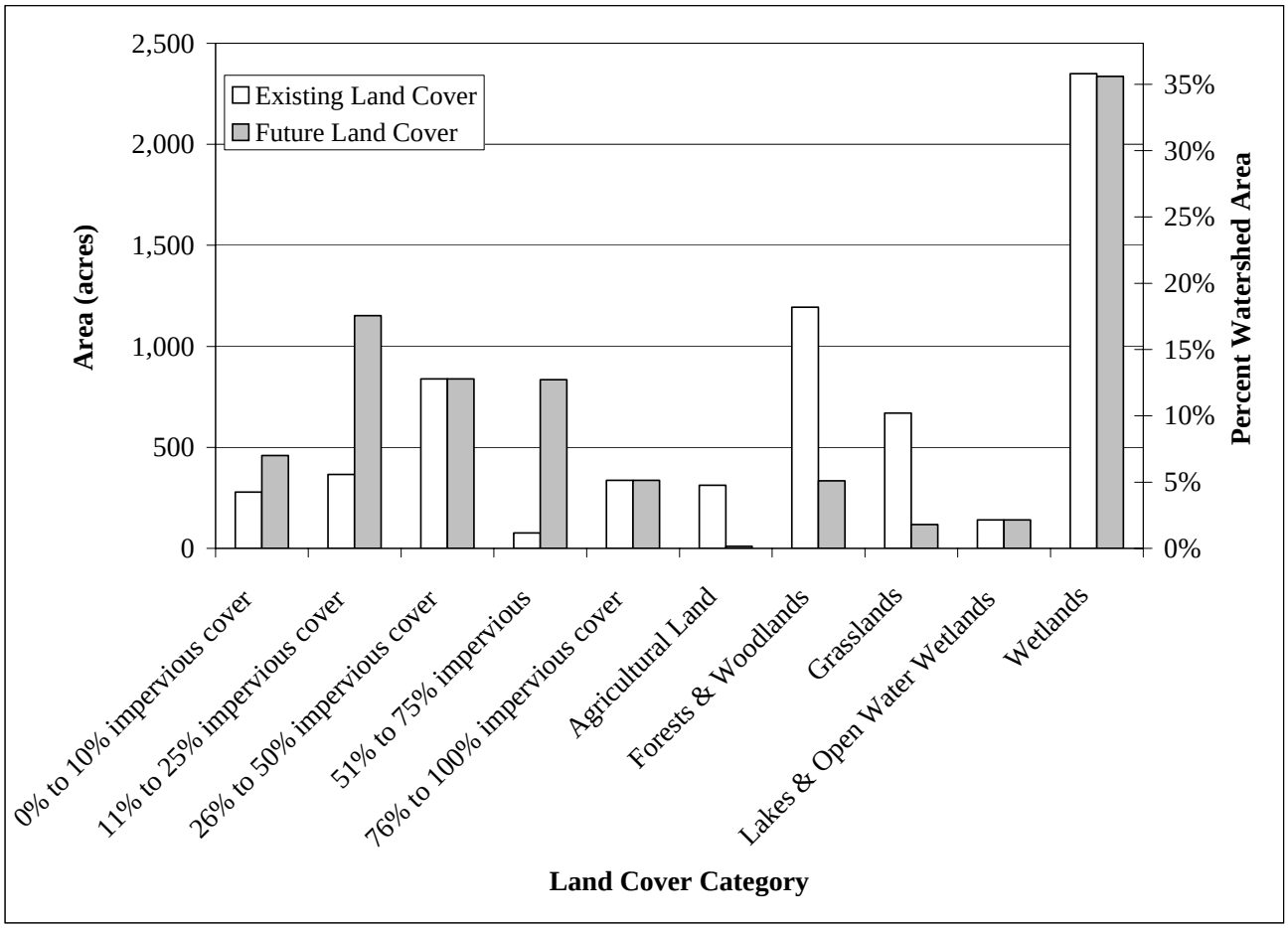


Figure 13: Total Phosphorus Yields by Subwatershed- Existing Conditions

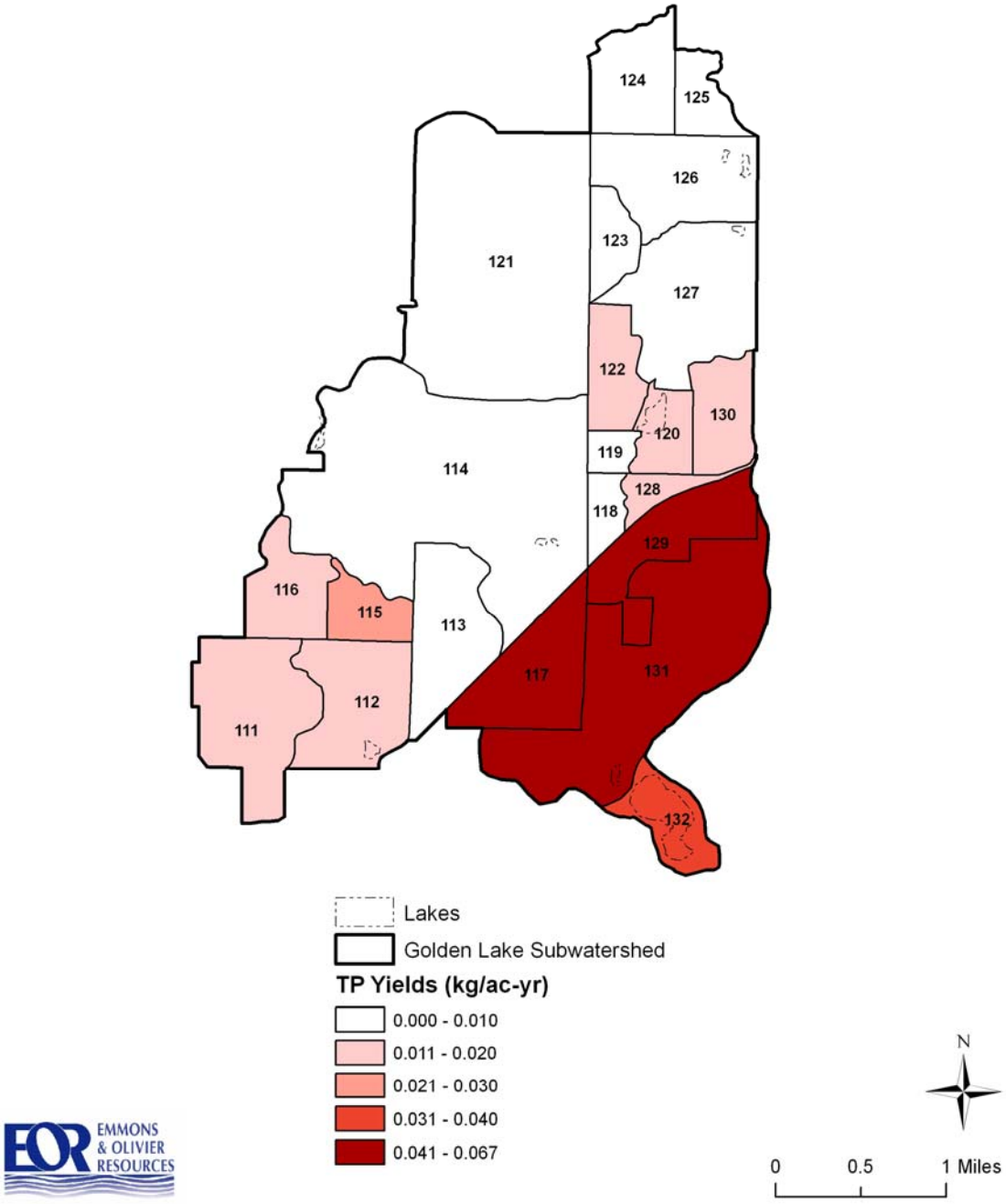
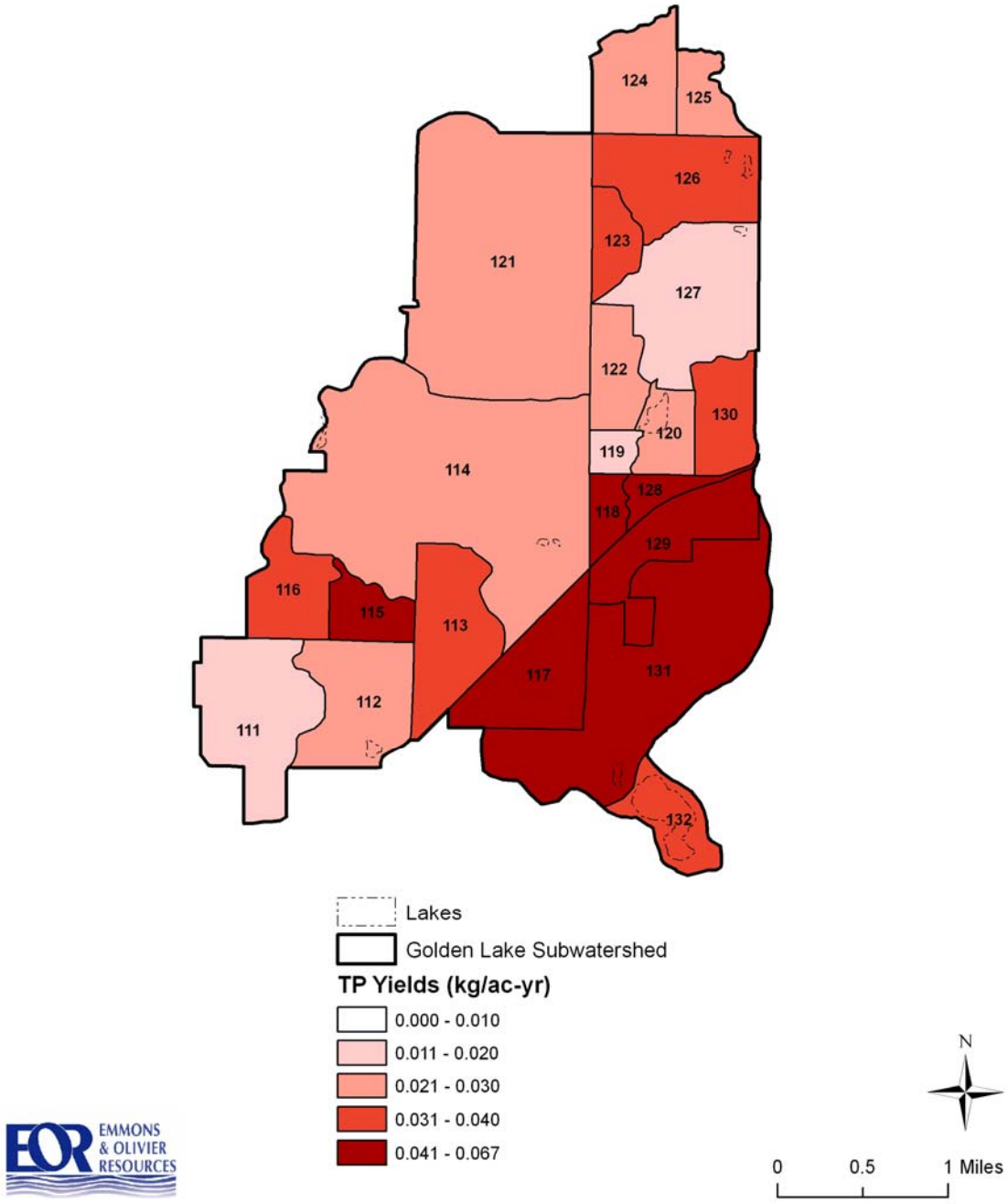


Figure 14: Total Phosphorus Yields by Subwatershed- Planned Land Use



Without the RMP, future development within the 53-62 watershed will greatly exacerbate water quality problems in Golden Lake. The TMDL study was utilized to provide the basis of determining what types of development standards would need to be implemented to ensure that current phosphorus loads in the watershed are maintained or decreased under future development. Strategies found in Rule M were modeled on a watershed basis. Results showed that if such a rule were developed and implemented for the entire RMP area, future development could occur within the upper watershed without increasing pollutant loads over current conditions. Without such stringent development standards proposed under the rule for this RMP, the goals of the TMDL will not be able to be met under future development conditions.

VII. REFERENCES

Anoka Conservation District. Hubs and Corridor Greenway Planning.

Center for Watershed Protection Website. http://www.cwp.org

City of Blaine, Minnesota. 2002. Northeast Area Plan Amendment, October 2002.

City of Blaine. 2001. Master Greenway Plan.

City of Blaine. 1999. Natural Resource Inventory.

Dahlgren, Shardlow and Uban. 2004. Rehbein Mixed Use Development: Environmental Assessment Worksheet. July 6, 2004.

Dechant, J.A., M.L. Sondreal, D.H. Johnson, L.D. Igl, C.M. Goldade, A.L. Zimmerman, and B.R. Euliss. 2001. Effects of management practices on grassland birds: Wilson's Phalarope. Northern Prairie Wildlife Research Center, Jamestown, ND. Northern Prairie Wildlife Research Center. Home Page. http://www.npwrc.usgs.gov/resource/literatr/grasbird/ambi/ambi.htm

Doyle, M.W., E.H. Stanley, and J.M. Harbor. 2003. Hydrogeomorphic controls on phosphorus retention in streams. *Water Resources Research* 39:1147.

Eggers, Steve D. and Donald M. Reed. 1987. Wetland Plants and Plant Communities of Minnesota and Wisconsin. U.S. Army Corps of Engineers, St. Paul District. December 1987. pp. 201.

Emmons and Olivier Resources, Inc. Engineer's Repair Report: Anoka County Ditch 53-62 Branches Addendum. December, 2004.

Emmons and Olivier Resources, Inc. Washington County Judicial Ditch #2 Repair Report. October 29, 2004.

Emmons and Olivier Resources, Inc. 53-62 CWMP Agency Supplement. December 22, 2003.

Emmons and Olivier Resources, Inc. ACD 53-62 Engineer's Repair Report: 890 CWMP Analysis Addendum. October 31, 2003.

Emmons and Olivier Resources, Inc. Anoka County Ditch 53-62 Comprehensive Wetland Management Plan. July 17, 2003.

Emmons and Olivier Resources, Inc. Engineer's Repair Report: Anoka County Ditch 53-62. July 16, 2003.

Emmons and Olivier Resources, Inc. Anoka County Ditch 53-62 Comprehensive Wetland Management Plan, Technical Report. February 3, 2003.

Helmers, D.L. 1992. Shorebird Management Manual. Western Hemisphere Shorebird Reserve Network. Manomet, MA. 58pp.

Husveth, Jason J. 2003. Ecological Surveys of Rare Plant and Plant Communities in Eastern Anoka County, Minnesota. Final report submitted to the Natural Heritage and Nongame Research Program, Minnesota Department of Natural Resources. 12 pp.

Janssen, Robert B. 1987. Birds in Minnesota. University of Minnesota Press.

Kantrud, H.A. 1981. Grazing intensity effects on the breeding avifauna of North Dakota native grasslands. Canadian Field-Naturalist 95: 404-417.

Karr, J. R. 2002. What from ecology is relevant to design and planning? Pages 133-172 in B. R. Johnson and K. Hill, editors. Ecology and Design: Frameworks for Learning. Island Press, Washington, DC.

Low Impact Development Center, Inc., 2002. Feasibility Study for the Use of Low Impact in Urban Areas for the Control of Wet Weather Flows,

Marschner, F.J. 1975. The Original Vegetation of Minnesota (map). U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station, St. Paul, MN.

Maryland Department of the Environment (MDE). 2000. Maryland Stormwater Design Manual. Baltimore, MD.

Metropolitan Council. 2004. 2030 Regional Development Framework. January 14, 2004. http://www.metrocouncil.org/planning/framework/Framework.pdf

Metropolitan Council 2001. Minnesota Urban Small Sites BMP Manual – Stormwater Best Management Practices for Cold Climates. Barr Engineering. Metropolitan Council. St. Paul, MN.

Meyer, Gary N., and Patterson, Carrie J. 1999. Surficial Geology of the Anoka 30 x 60 Minute Quadrangle, Minnesota, Map M-97. Minnesota Geological Survey.

Minnesota Board of Water and Soil Resources. April 2004. Minnesota Routine Assessment Methodology for Evaluating Wetland Functions., Version 3.0,

Minnesota Department of Natural Resources. Natural Resources Inventory and Assessment.

Minnesota Department of Natural Resources, 2004. Minnesota Land Cover Classification System User Manual Version 5.4. St, Paul, MN.

Mossler, John H., and Tipping, Robert G. Bedrock Geology and Structure of the Seven-County Twin Cities Metropolitan Area, Minnesota, Map M-104; U of M Minnesota Geological Survey.

Mulholland, P.J., J.D. Newbold, J.W. Elwood, and L.A. Ferren. 1985. Phosphorus spiraling in a woodland stream: seasonal variations. *Ecology* 66:1012-1023.

Mulholland, P.J., and W.R. Hill. 1997. Seasonal patterns in streamwater nutrient and dissolved organic carbon concentrations: Separating catchment flow path and in-stream effects. *Water Resources Research* 33:1297-1306.

Naugle, D.E. 1997. Habitat area requirements of prairie wetland birds in eastern South Dakota. PH.D. dissertation. South Dakota State University, Brookings, South Dakota. 85pp.

Rice Creek Watershed District. 2004. The Future of Water Resource Management in the Rice Creek Watershed District, 2004 Work Plan. The Rice Creek Watershed District Strategic Plan. www.ricecreekwd.com

State of Minnesota Storm-Water Advisory Group. Storm-Water and Wetlands: Planning and Evaluation Guidelines for Addressing Potential Impacts of Urban Storm-Water and Snow-Melt Runoff on Wetlands. 1997.

United States Army Corps of Engineers- Environmental Laboratory, 1987. "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1, US Army Engineer Waterways Experiment Station, Vicksburg, Miss.

United States Army Corps of Engineers. 2002. Approaches for the Mitigation of Water Quality Functions of Impacted Wetlands – A Review. Steven Ashby. Wetlands Regulatory Assistance Program. ERDC TN-WRAP-02-03. May 2002.

United States Army Corps of Engineers. 2002.Technical and Scientific Considerations for Upland and Riparian Buffer Strips in the Section 404 Permit Process. Wetlands Regulatory Assistance Program. ERDC TN-WRAP-01-06. May 2002.

United States Department of Agriculture. 1977. Soil Survey of Anoka County, Minnesota; USDA SCS in coop. with U of M Agricultural Experiment Station. September 1977.

Weber, M.J., P.A. Vohs, Jr., and L.D. Flake. 1982. Use of prairie wetlands by selected bird species in South Dakota. Wilson Bulletin 94: 550-554.

Weber, M.J. 1978. Non-game birds in relation to habitat variation on South Dakota wetlands. M.S. thesis. South Dakota State University, Brookings, South Dakota. 54pp.

APPENDIX A: GEOLOGIC HISTORY OF RMP AREA

Anoka Sand Plain
With the recession of the last glaciations from Central Minnesota, several distinct landforms appeared. Each one is distinguished by the kind of glacial material left behind, such as silts, sands, gravel, coupled with the topographic pattern of lakes, rivers, and wetlands. The Anoka Sand Plain is one of the distinct landforms of Central Minnesota. The glacial sand coupled with the minimal change in elevation are the distinguishing features. These features are responsible for the highly interspersed pattern of terrestrial, aquatic, and wetland habitats found here.

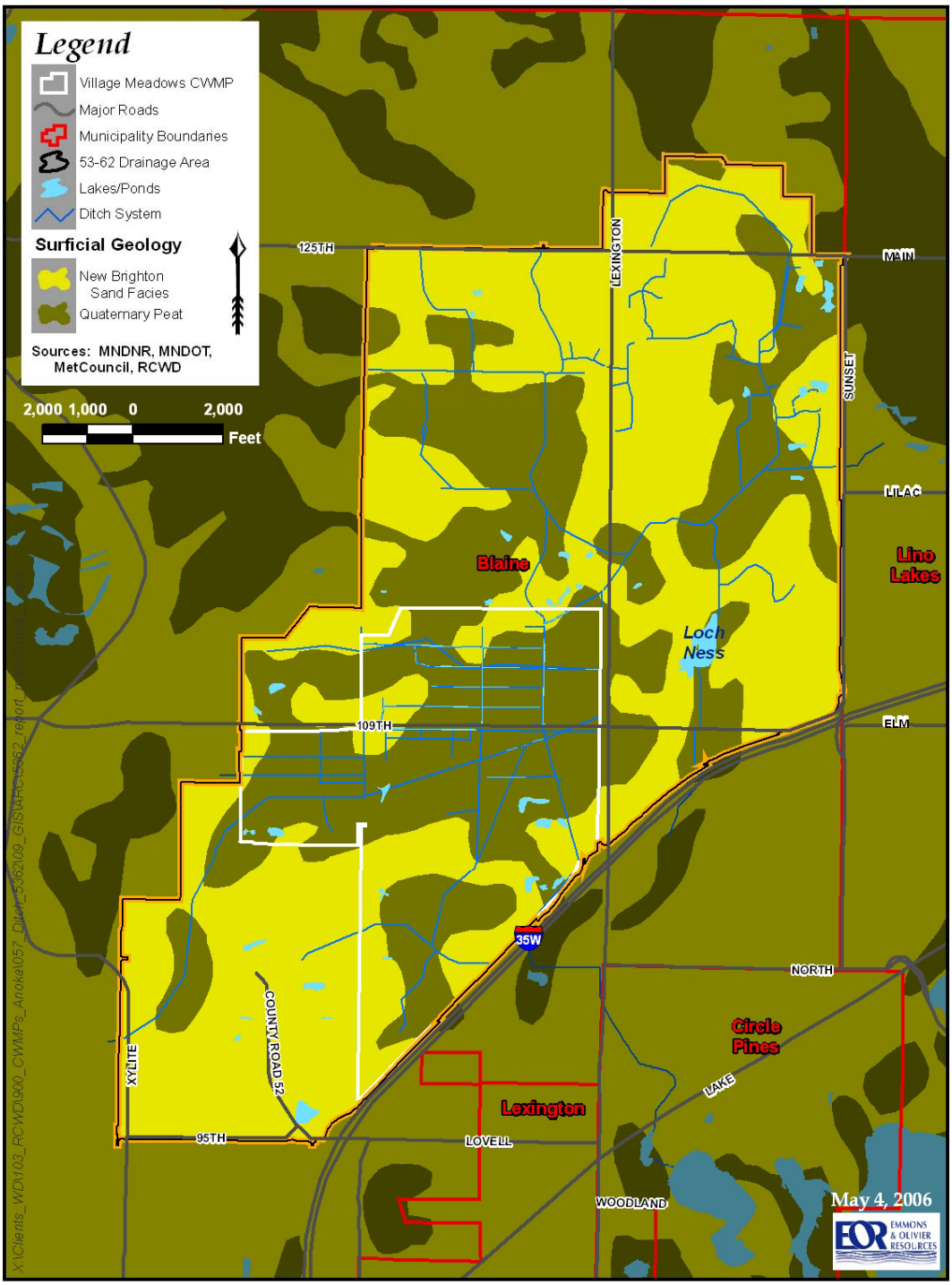
Geology and Soils
The geology of the ACD 53-62 Drainage Area in the west-central portion of Rice Creek Watershed District consists of a 200 to 300 foot thick layer of glacial and post-glacial deposits overlying bedrock. The surface topography is slight, fluctuating only 14 feet in elevation within the 53-62 Drainage Area, and has a soil composition that allows for little natural drainage.

Surficial Geology
The ACD 53-62 Drainage Area is underlain by Des Moines Lobe glacial deposits of the Wisconsinan Glaciation. Part of the Grantsburg Sublobe of the Des Moines Lobe that flowed through the area bringing with it gray drift from Manitoba and the Red River Valley and the glacier retreated approximately 12,500 years ago. As the glacier wasted, Glacial Lake Fridley formed along the eastern edge of Anoka County and at the location where 53-62 Drainage Area is presently located.

The quaternary geology consists of a mix of glacial sands and post glacial organic deposits. The glacial sands are part of the New Brighton Formation and are composed of sediment deposited in Glacial Lake Fridley. This formation consists of fine to medium-grained sand that is loamy in places, with scattered lenses of silt to silty sand. The upper few feet of sand has commonly been reworked by wind action. Within the study area, the New Brighton Formation is partially overlain by organic peat accumulated in depressions formed within the glacial sand deposits. These organic peat deposits consist of partially decomposed plant matter deposited in marshes, with muck interspersed.

Bedrock Geology
The topmost bedrock layer beneath the study area is the St. Lawrence-Franconia Formation. This formation is one of the Paleozoic bedrock layers that was formed by the transgression and regression of a vast inland sea hundreds of millions of years ago. It is composed of dolomitic shale, siltstone, and dolostone that overlie fine to coarse-grained sandstone. The formation is sedimentary in origin as eroded materials from the north were transported to the flat inland sea and accumulated over time. The 53-62 Drainage Area lies at the northerly end of the Twin Cities Basin, and due to the shape of the basin, the younger Paleozoic rocks that are found under Minneapolis-St. Paul were eroded away before the glacial sediment was deposited at this site.

Figure 15. Surficial Geology within RMP area.



Soils

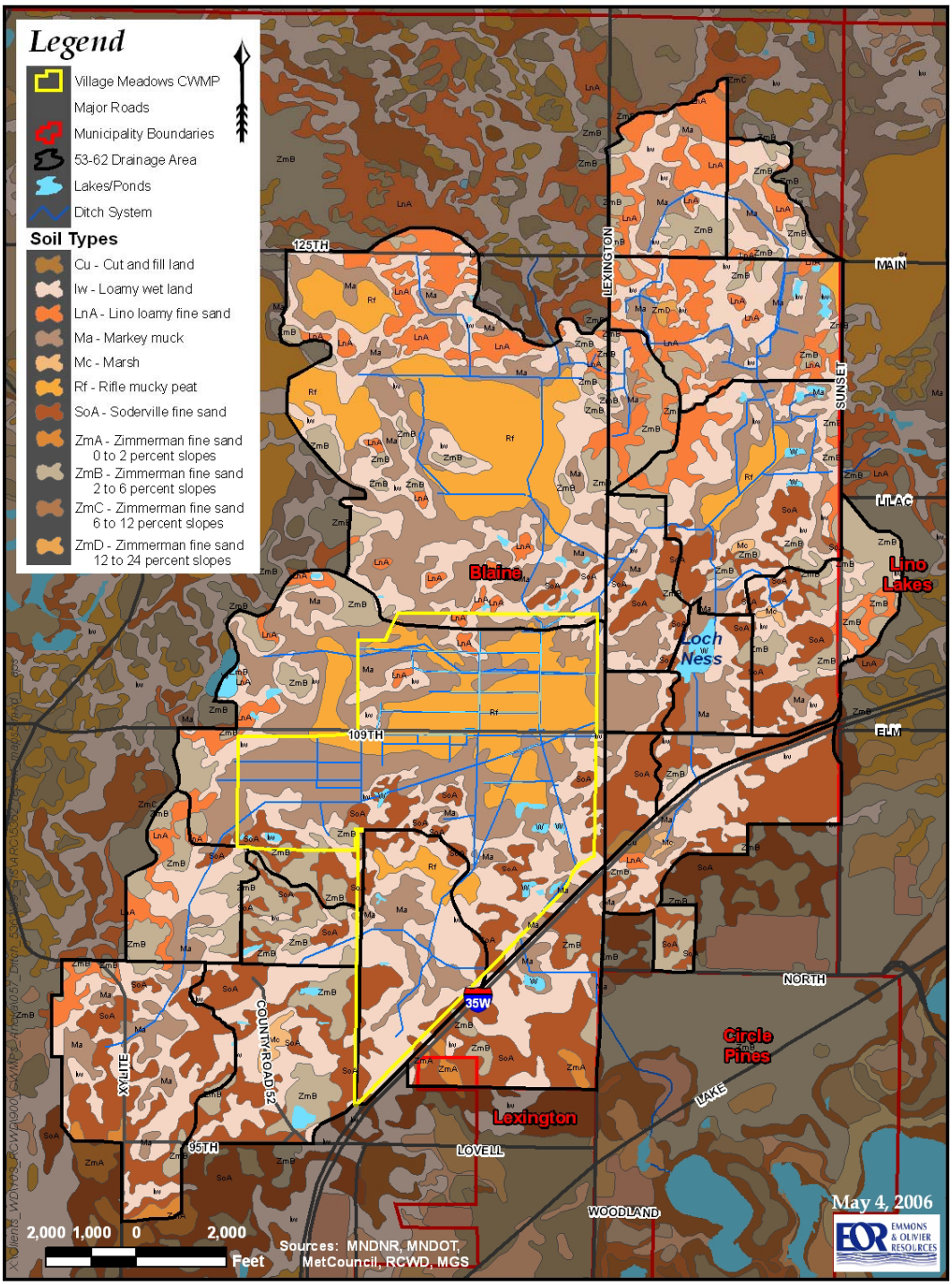
There are two soil associations within ACD 53-62 Drainage Area. Approximately 80 percent of the area is comprised of the Rifle-Isanti Association. The remaining 20 percent is part of the Zimmerman-Isanti-Lino Association.

The Rifle-Isanti Association is nearly level in topography, and has very poor drainage. It is comprised chiefly of organic material (muck, mucky peat), with some fine sand intermingled. Organic bogs with small sandy island features are common in this association. The natural water table is very high, usually between 0 and 2 feet from the surface. The Rifle-Isanti Association is poorly suited for urban, agricultural, and recreational uses.

The Zimmerman-Isanti-Lino Association is mainly found in the broad undulating glacial sand deposits. It is dominated by fine sands about 2 to 6 inches thick. The water table is high, usually between 2 to 6 feet from the surface. Much of this association is better suited for urban, agricultural, or recreational uses, unless the water table limits such uses.

The soils within the project area have been analyzed extensively. Soil borings, test pits, and hydrologic monitoring gauges have all been completed on the site to help determine peat/muck depths, historic ditch profiles and ground water elevations. All evidence indicates that peat/muck depths are extremely variable throughout the site.

Figure 16. Soils within RMP area.



APPENDIX B: EARLY LAND USE

Pre-European Settlement
Following is an excerpt from the original land survey notes written by Andrew J. Hewitt, Deputy Surveyor in 1847. Mr. Hewitt described the township as follows:

> This township presents a surface almost level to the eye of the beholder. It is one dense marsh, interspersed at intervals with numerous islands; small lakes or ponds and tamarack swamps. The islands vary in size, from one to ten acres and most of them covered with thick brush and timber of various kinds. The water in the lakes or ponds is generally clear and cold and most of them have fish in them of various kinds. The margins of them are generally marshy and springy. This township is almost inaccessible either for man or beast excepting when frozen up. A small portion of the northern portion of this township is barrens, covered with short thin grasses and scattering near by Jack-oak trees. The soil on the bare site is light, loose sand 3rd rate.

In addition, the entire section line between sections 14 and 23 (location of current 109th Avenue) was described by Hewitt as a "Level floating Marsh".

Francis J. Marschner interpreted original land survey notes to create a presettlement vegetation map for the entire state of Minnesota. Figure 17 illustrates presettlement vegetation communities identified by Marschner. His work identified the following dominant plant communities within the RMP.

Aspen and Oak Woodland: The community developed primarily on sites with wet, poorly drained soils and high water tables, although the water table is usually not high enough to affect the ground layer composition of the community or to cause peat accumulation. The tree canopy most often is dominated by quaking aspens. Paper birches, balsam poplars, bur oaks, pin oaks, green ashes, or basswoods are minor canopy trees, although they may be abundant in the understory as seedlings and saplings. On low, poorly drained sites balsam poplars are sometimes more abundant than quaking aspens in the tree canopy. The understory of Aspen Forests tends to be brushy. American hazelnut is almost always abundant in the understory. Other shrubs vary in presence and abundance with soil moisture, which ranges from wet-mesic to dry. The ground layer is composed mostly of forest herbs and grasses capable of surviving in the shade under the dense shrub layer. These species include wild sarsaparilla, Canada mayflower, the sedge *Carex pensylvanica*, false melic grass, and mountain rice-grass. Aspen Forest is an early-successional community. With prolonged absence of fire or other disturbances, Aspen Forests succeed to mid-successional forests composed of the minor canopy tree species listed above. An analysis of land survey records indicates that relatively pure stands of quaking aspen historically occurred on level terrain rather than on rough topography, suggesting that these stands were maintained by fire and windthrow. The aspen trees were present most commonly on somewhat poorly drained mineral soils, especially drumlin fields and other landforms with heavy soils, while paper birch, pin oak, and bur oak trees associated with the aspens were probably present on local areas of better drained soils. Plots of aspen trees from early public land survey records show that aspen also occurred on areas of relict prairie soils within the deciduous forest-woodland

zone. These sites are now mainly forested, but the land survey records indicate that the aspen trees previously were scattered widely enough on them to constitute woodland rather than forest. This is consistent with the surveyors' written descriptions of these sites.

Lakes and Open Water: These communities were characterized by permanently flooded water situated in a topographic depression or a dammed river or stream channel. Some of the original lake beds and open water habitats contained little to no vegetation. However, a majority of the shallow open water habitats did have a sparse cover of submergent and floating aquatic vegetation consisting of plants such as pondweeds, water lilies, coontail, Elodea, duckweed, and bladderwort. Fringes of emergent vegetation surrounded these open water habitats, consisting of such plants as bulrush, spikerush, iris, skullcap, sedges, cattail, and spotted touch-me-not.

Oak Openings and Barrens: Oak Openings and Barrens, also known as Dry Oak Savannas, were characterized by widely spaced to clumped stands of large, spreading bur oak over a ground layer dominated by graminoid and herbaceous prairie species. Typical grasses included little bluestem, side-oats grama and hairy grama, prairie junegrass, needle grass, plains muhly, prairie dropseed, Wilcox's panic grass, blue grama, and sand reedgrass. Some widespread, characteristic forbs included dotted blazing star, pasque flower, prairie golden-aster, stiff sunflower, silky aster, stiff goldenrod, gray goldenrod, Missouri goldenrod and narrow-leaved puccoon, as well as rough blazing star, buffalo-bean, silverleaf, Louisiana sagewort, prairie larkspur, hoary puccoon, prairie smoke, and wood lily. Three sub-shrubs - leadplant, prairie rose, and wolfberry - were also generally present. Dry Oak Savanna communities existed on moderately sloping south-southwest facing slopes and well drained soils.

Wet Prairie: Wet Prairies occurred mainly in broad, shallow basins where bedrock is relatively near the surface. In these areas, the water table remained within the plant-rooting zone for several weeks during the growing season, but inundation occurred only infrequently and briefly. In some wet prairies, groundwater seepage caused soils to be very moist or wet. Grasses typically dominated this community, including prairie cordgrass and blue-joint grass, with occasional patches of fringed brome and/or big bluestem. Sedges were also often present, with an abundance of forbs including panicled aster, New England aster, giant goldenrod, Riddell's goldenrod, giant sunflower, sawtooth sunflower, sneezeweed, gay-feather, blazing-star, grass-leaved goldenrod, golden Alexander, closed gentian, and prairie loosestrife. Small willows and meadowsweet were common, with willow and aspen trees often growing either singly or scattered in small clumps along wetland margins.

Agricultural Ditching Era

ACD 53-62 is a ditch system that was first constructed in the early 1900s. Most of the drained wetlands were originally used for hay production. During dry years agricultural crop such as corn and vegetables were grown in the rich soils.

Figure 17. Marschner Map

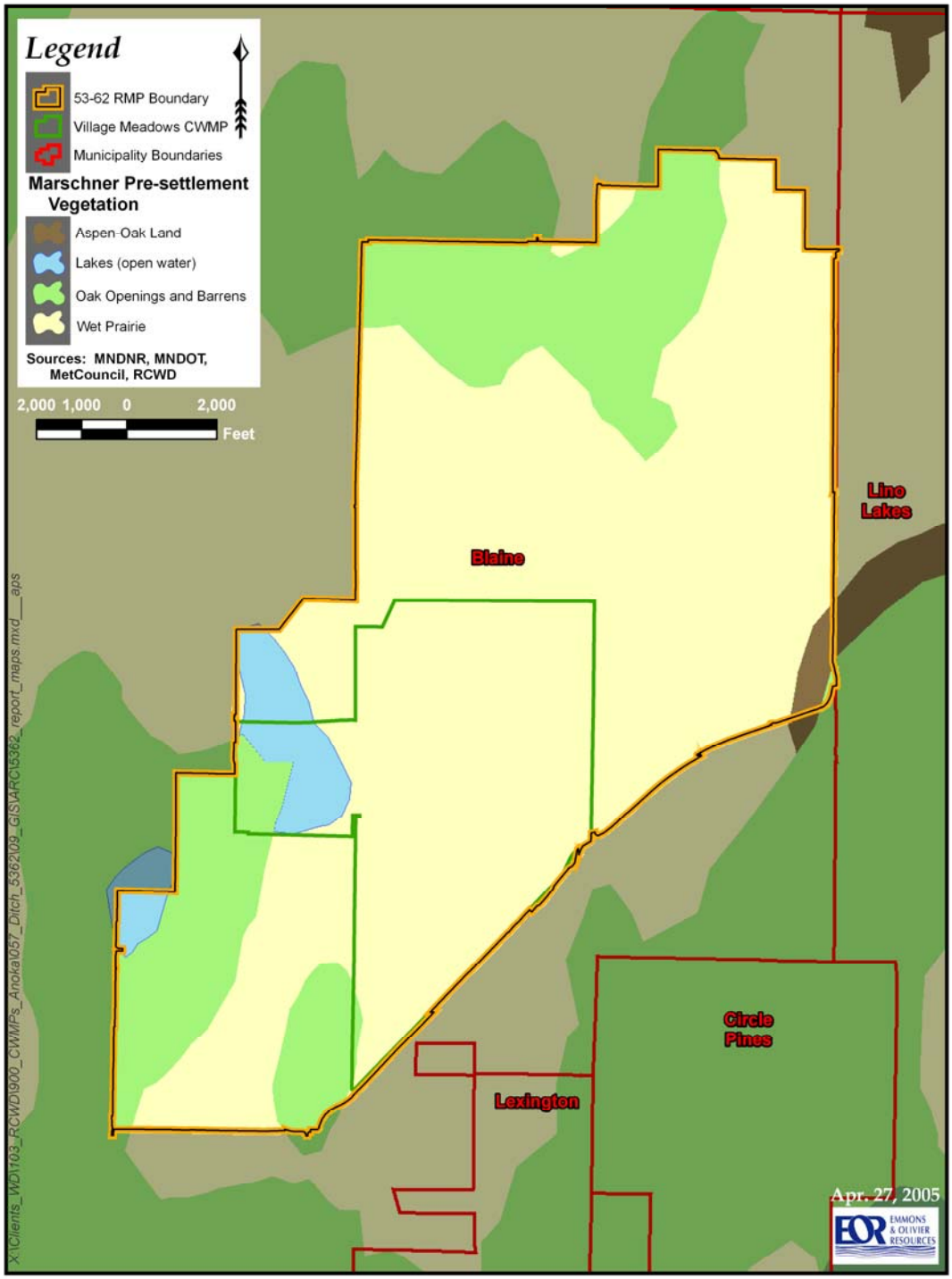
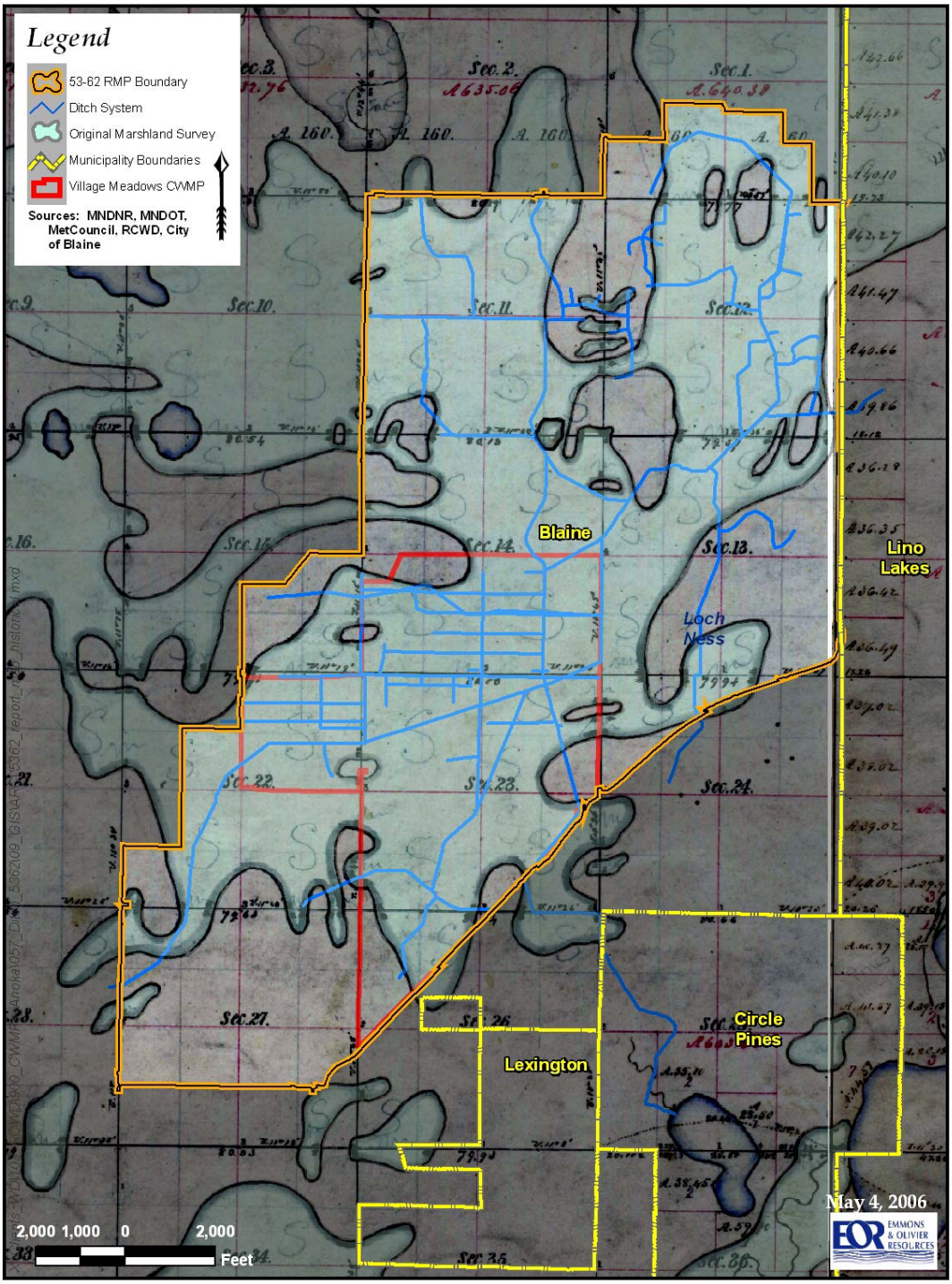


Figure 18. Historic Wetland Survey.



APPENDIX C: EXISTING VEGETATION COMMUNITIES

Oak forest mesic subtype: The oak forests are some of the better quality plant communities found within the project area. The southeast corner of the 53-62 project area has an AB quality mesic oak forest. This community has been included within the WPZ boundaries and protected. Plant species found in the oak forests include: red, bur, and white oaks, American hazel, Pennsylvania sedge, hogpeanut, hay-scented bedstraw, wild geranium, black snakeroot, twoleaf anemone, false Solomon's seal, and Canada mayflower

Northern hardwood forest: Several forest communities resembling the Northern hardwoods forest are found in the middle of the 53-62 project area. Although these forests were once likely either Oak forest or Oak woodland, the quality of these plant communities are ranked as BC because of the diversity of native plants. Tree species found include: Basswood, Paper Birch, Black Cherry, Green Ash, Elm and Aspen. Only a few Oaks were found. Ground cover species include Pennsylvania sedge, bedstraw, Jack-in-the pulpit and bottlebrush grass.

Aspen-Birch forest: A plant community resembling the more northern Aspen-Birch forest was found within the site. The quality of this community is ranked at BC because of its diverse native plant species. Paper birch and trembling aspen were the dominant tree species and the ground cover was dominated by hay-scented bedstraw, wild viola, grasslike starwort, sedges, common milkweed, asters, and sensitive fern.

Lowland hardwood forest: The lowland hardwood forests found within the site are of high, medium, and low qualities. The higher quality lowland hardwood forests are in the southern half of the 53-62 project area, and surround some of the higher quality rich fen communities. The lower quality lowland hardwood forest communities can be attributed to the prevalence of reed canary grass. Tree species found include: cottonwood, trembling aspen, elm, boxelder and green ash. Some of these wetland communities are mapped as a Type 7 wetland by the NWI. The hydrologic regime and characteristics of these communities are closer to a Type 1, PFO1A.

Aspen forest: The aspen forests found within the project area have saturated and temporarily flooded hydrologic regimes. They are ranked as BC and C quality, and are primarily found scattered throughout the northern half of the 53-62 project area. Plant species found in the ground layer included a few scattered sedges, rough bedstraw, and water horehound, but they were mostly dominated by reed canary grass.

Black ash swamp: Two black ash swamps occur in the 53-62 project area, and are of low quality due to their histories of high disturbance. On the Anoka Sand Plain, Black ash swamps are known to occur as narrow zones or as small inclusions in wetland complexes, dominated by black ash trees.

Mixed hardwood swamp: Several mixed hardwood swamps occur in the northern half of the 53-62 project area and are of moderate quality. On the Anoka Sand Plain, Mixed hardwood swamps are commonly found in shallow wetlands, especially near upland margins on sites that are not too wet.

Birch bog- spiraea swamp: This plant community is found in the very northern portion of the 53-62 project area. The quality of this wetland is ranked at BC because of its disturbed status, but is protected within the WPZ boundaries because it contains a very unique diversity of plant species and surrounds the only tamarack swamp in this portion of Anoka County.

Tamarack swamp: This plant community is found in the very northern portion of the 53-62 project area. The quality of this wetland is ranked at BC because of its disturbed status, but is protected within the WPZ boundaries because it occurs in a very sensitive assemblage of rich fen-birch bog-spiraea swamp complex, and is the only tamarack swamp in this portion of Anoka County.

Willow swamp: This plant community type is found scattered throughout the site. Some of the better quality willow swamps are found in the south central portion of the 53-62 project area. Quality rankings varied from B through CD. Plant species found within this community type include: sandbar and black willow, arrowhead, sensitive fern, path rush, joe-pye weed, ostrich fern, lake sedge, tussock sedge, bluejoint grass, and native yellow loosestrife.

Wet Prairie*:* There are several wet prairies in the southern and southeastern portion of the 53-62 project area. These wet prairies are very unique plant communities, and several are of superior quality because of their rich plant diversity. Plant species found include hardhack, sensitive fern, purple prairie clover, lousewort, several sedge species, several goldenrod species, and yarrow.

Non-native dominated grassland: These plant communities are found on uplands and temporarily flooded wetlands. Reed canary grass dominates the most of these communities. Smooth brome is found on the drier sites.

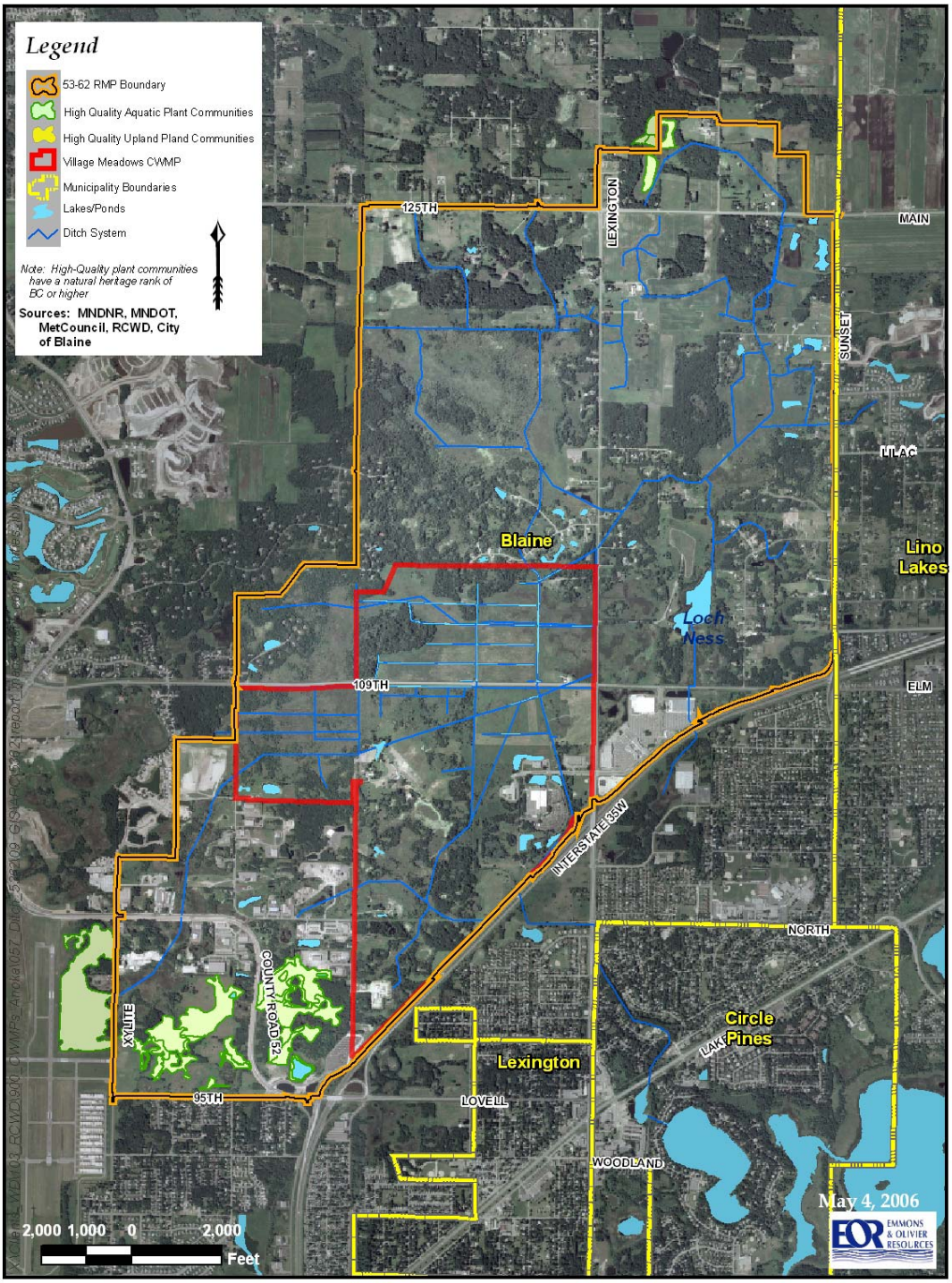
Cattail marsh: Cattail marshes found with in the project area are of two hydrologic regimes – saturated and seasonally flooded. Broad leaved cattail is the dominant plant present but some arrowhead and softstem bulrush are found as well. Relative quality of the cattail marshes are low because of they are primarily cattail monotypes.

Non-native dominated emergent vegetation: Although reed canary grass is not typically considered an emergent, in this case it is found growing on remnant hummocks in seasonally flooded areas. This was found more frequently in the southern portions of the site where sod farming practices have not destroyed the hummocks.

Grassland with sparse deciduous trees - non-native (herbaceous) dominated vegetation: These plant communities can be described as having a few scattered deciduous trees such as elm, boxelder, willow, cottonwood and green ash and a dense ground cover of reed canary grass or smooth brome.

Open water: Open water areas consist of ditches and small excavated ponds throughout the 53-62 project area. A few plants such as arrowhead and softstem bulrush are found on the fringes of these open water habitats but for the most part their fringes are too steep to support significant vegetative growth. Almost all of the open water habitats are low quality.

Figure 19: High Quality Plant Communities



APPENDIX D: WILDLIFE

The wetland preservation areas will be restored and managed to enhance habitat for wildlife currently occupying the area. The WPZs will include interspersed upland that is a requirement for many of the animal species using wetlands. Because of the diversity of habitat many avian species can be found throughout the area and therefore attract many bird watchers. A few more rare species noted include the Upland Sandpiper, American Bittern, Bobolink, Yellow-headed Blackbirds, Sand Hill Crane and various shorebird species. Habitat features to be considered will be cover, foraging, and nesting requirements. Particular attention will be given to address the needs of the state-listed Wilson's Phalarope. Upland will provide appropriate nesting habitat for ground nesting birds and reptiles such as turtles. Where WPZs are located on opposing sides of roadways or other wildlife hazards, safe wildlife crossings will be incorporated to the greatest extent possible. Habitat restoration and management planning will be undertaken by specialists operating jointly for RCWD and the City of Blaine and utilize shorebird management resources such as the Shorebird Management Manual of the North American Waterfowl Management Plan, publications of the Northern Prairie Wildlife Research Center, publications of Environment Canada, and the U.S. Shorebird Conservation Plan.

STATE AND FEDERALLY LISTED SPECIES:

Wilson's Phalarope (*Phalaropus tricolor*) is a state threatened species that has used land in the project area for nesting. Certain areas may be designated as Wilson's phalarope management units and solely managed to meet the habitat requirements of this species. Competing management needs such as regional water quality and quantity, as well as passive recreational uses, will be secondary in Wilson's Phalarope management units. Emergent vegetation, open shoreline, and some limited seasonal open water habitat types are overall landscape features of preferred habitat. Nesting usually occurs in areas less than 100m from open water shorelines in upland grasslands and wet meadows. Typical nesting vegetation is of medium height and moderate density. Wilson's Phalarope prefer seasonal and semi-permanent wetlands and intermittent streams. Thick-stemmed vegetation such as river bulrush and cattail are not preferred. As such, wetland restoration which creates wetland Type 2 hydrologic regimes will be targeted specifically for enhancing habitat for Wilson's Phalarope. The use of mowing and burning for native grassland management and reed canary grass control will have to be timed to consider the critical nesting periods for Wilson's Phalarope and not just to optimize the vegetation management. It is expected that fledglings should be off the nest by mid to late July. Management activities will be based upon annual monitoring of nesting sites.

The restoration and management of seasonal and semi-permanent wetland hydrologic regimes will provide habitat for Wilson's Phalarope during dry and wet years. Wet meadows adjacent to deeper wetlands will enable adult phalaropes to move their young more easily from their nests to wetlands and limit predation of young. The hydrologic regimen of the northwest wetland complex will be manipulated through drawdowns and seasonal flooding. This will provide a sustainable forage base for a variety of shorebirds including phalaropes. If weather conditions are conducive, the northwest wetland complex will be flooded sometime during the month of October. This prevents the entire area from freezing and

enables chironomids and other invertebrates to reproduce and ensures the survival of larvae over winter. Spring and early summer floods will be slowly released (1" a week) to allow exposure of invertebrates to migrating shorebirds foraging among the shorelines and mudflats.

OTHER NOTABLE WILDLIFE SPECIES:

The **Bobolink** (*Dolichonyx oryzivorus*) requires grasslands, including marsh edges for nesting and foraging. Nesting and fledging continues through mid-July. Restoration and management of the interspersed grassland portions of the WPZs will consider the habitat requirements of the Bobolink, keeping in mind that both sexes tend to return to the same vicinity year after year. This species will forage on seeds of many common forbs found in old field vegetation. Nesting is preferred in shorter vegetation with reduced amounts of thatch. Mowing has been an effective practice to develop preferred Bobolink nesting habitat, but any management that meets the goals to reduce thatch build up and woody cover to less than 25% will be considered. Management will occur only outside the nesting season from April – July. An area of north 109th Street currently supports about five nesting pairs (personal observation) and is proposed to be managed specifically for Bobolink habitat. Publications from the Northern Prairie Wildlife Research Center and Wisconsin Department of Natural Resources were consulted for additional management planning.

In 1991 an **American Bittern** (*Boutaurus lentiginosus*) was observed and heard during the breeding season. The area was described by the observer as a wetland that is currently being used for sod production. American Bitterns are a regular migrating species that is a summer resident. They are most commonly found in northwestern Minnesota and uncommon throughout the remainder of the state. Habitat preferences include emergent marshes and wet meadows. The creation and management strategies for this RMP are not specifically design to accommodate the American Bittern but suitable habitat will be preserved, restored and created.

In 1990 a pair **Upland Sandpipers** (*Bartramina longicauda*) was observed within the project area. From the activities observed, breeding was inferred. Upland Sandpipers are a regular migrating species that is a summer resident. They are most common in western Minnesota and scarce to absent in the remainder of the state. Habitat preferences included prairies, wet meadows and pastures. Suitable habitat will be created, preserved and restored throughout the RMP but no specific management strategies will be incorporated to accommodate the Upland Sandpiper.

A record of a **Sandhill Crane** (*Grus canadensis*) exists for the project area from 1996. At that time the bird was heard and observed utilizing a wetland area during the breeding season. As recent as the spring of 2004 a group of 3-4 Sandhill Cranes, including fledglings, were observed by RCWD staff north of 109th Avenue. Sandhill Crane sightings have become more common through out Anoka County in recent years. They prefer open grasslands, wet meadows and marshes for nesting and foraging. The RMP will continue to provide adequate habitat for use by sand hill cranes.

COMMON WILDLIFE SPECIES:

The vast diversity and extent of habitat throughout the RMP area provides significant habitat. Based on type of habitat, geographic location and evidence, wildlife inventory lists have been developed for this RMP area. The following tables indicate species that are likely to occur within the RMP area.

Table 12: Project Area Wildlife Lists

Project Mammal List						
	Common Name	***Scientific Name***	**Occurrence**	**Prairie**	**Deciduous Forest**	**Water/ Wetland**
Marsupials	Opossum	*Didelphis virginiana*	I		4	
Insectivores	Masked Shrew	*Sorex cinereus*	I		1,2	
	Short-tailed Shrew	*Blarina brevicauda*	I	●	1	
	Eastern Mole	*Scalopus aquaticus*	I	●	2	
Bats	Little Brown Bat	*Myotis lucifugus*	I	●	●	
	Eastern Pipistrelle	*Pipistrellus subflavus*	p		4	
	Big Brown Bat	*Eptesicus fuscus*	I	●	3	
	Red Bat	*Lasiurus borealis*	p	●	3	
Lagomorphs	Eastern Cottontail	*Sylvilagus floridanus*	I	●	3	
Rodents	Woodchuck	*Marmota monax*	I	●	3,4	
	Eastern Chipmunk	*Tamias striatus*	I		4	
	Thirteen-lined Ground Squirrel	*Spermophilis tridecemlineatus*	I	●		
	Gray Squirrel	*Sciurus carolinensis*	I		4	
	Fox Squirrel	*Sciurus niger*	p	●	3	
	Red Squirrel	*Tamiasciurus hudsonicus*	I		4	
	Southern Flying Squirrel	*Glaucomy volans*	I		4	
	Plains Pocket Gopher	*Geomys bursarius*	I	●		
	Beaver	*Castor canadensis*	I	●	3,4	●
	Deer Mouse	*Peromyscus maniculatus*	I	●	3	
	White-footed Mouse	*Peromyscus leucopus*	I		4	
	Meadow Vole	*Microtus pennsylvanicus*	I	●	3	
	Muskrat	*Ondatra zibethica*	I			●
	Meadow Jumping Mouse	*Zapus hudsonius*	I	●	1,3	

	Common Name	*Scientific Name*	Occurrence	Prairie	Deciduous Forest	Water/ Wetland
Carnivores	Red Fox	*Vulpes vulpes*	l	●	3	
	Gray Fox	*Urocyon cinereoargenteus*	l		4	
	Coyote	*Canis latrans*	l	●	4	
	Raccoon	*Procyon lotor*	l	●	3,4	
	Ermine	*Mustela erminea*	l		3	
	Long-tailed Weasel	*Mustela frenata*	l	●	1,3,4	
	Mink	*Mustela vison*	l	●	3,4	●
	Striped Skunk	*Mephitis mephitis*	l	●	●	
Ungulates	White-tailed Deer	*Odocoileus virginianus*	l		3	

p= Possible
l= Likely

1 = Moist-mesic
2 = Dry/ savanna
3 = Woodland edges/ partially open areas
4 = Wooded/ bushy

Project Amphibian and Reptile List

	Common Name	*Scientific Name*	Occurrence	Prairie	Deciduous Forest	Water/ Wetland
Turtles	Snapping Turtle	*Cheldyra serpentina*	l			●
	Painted Turtle	*Chrysemys picta*	l			●
	Blanding's Turtle	*Emydoidea blandingii*	p			●
Lizards	Prairie Skink	*Eumeces septentrionalis*	l	●		
Snakes	Racer	*Coluber constrictor*	p	●	2,3	
	Fox Snake	*Elaphe vulpina*	p		1	
	Eastern Hognose Snake	*Heterodon platirhinos*	p		3	
	Western Hognose Snake	*Heterodon nasicus*	p	●	2,3	
	Milk Snake	*Lampropeltis triangulum*	p		3,4	
	Smooth Green Snake	*Ophedrys vernalis*	l		3	
	Gopher Snake	*Pitophis catenifer*	l	●		
	Redbelly Snake	*Soreria occipitomaculata*	l	●	4	
	Common Garter Snake	*Thamnophis sirtalis*	l	●	●	●
Salamanders	Blue-spotted Salamander	*Ambystoma laterale*	l		1	●
	Tiger Salamander	*Ambystoma tigrinum*	l	●	1	●
Toads and Frogs	American Toad	*Bufo americanus*	l	●	●	●
	Gray Treefrog	*Hyla versicolor*	l	●		●
	Spring Peeper	*Pseudacris crucifer*	l	●		●
	Western Chorus Frog	*Pseudacris triseriata*	l	●	●	●
	Green Frog	*Rana clamitans*	l		●	●
	Northern Leopard Frog	*Rana pipiens*	l	●	●	●
	Wood Frog	*Rana sylvatica*	l		1	●

p= Possible
l= Likely

1 = Moist-mesic
2 = Dry/ savanna
3 = Woodland edges/ partially open areas
4 = Wooded/ bushy

Project Bird List

	Common Name	*Scientific Name*	Occurrence	Migrant	Prairie	Deciduous	Water/
				Resident		Forest	Wetland
Loons and Grebes	Red-throated Loon	*Gavia stellata*	u	----			
	Pacific Loon	*Gavia pacifica*	u	----			
	Common Loon	*Gavia immer*	l	Resident			●
	Pied-billed Grebe	*Podilymbus podiceps*	l	Resident			●
	Horned Grebe	*Podiceps auritus*	u	----			●
	Red-necked Grebe	*Podiceps grisegena*	p	Resident			●
	Eared Grebe	*Podiceps nigricollis*	u	Resident			●
	Western Grebe	*Aechmophrus occidentalis*	u	Resident			●
	Clark's Grebe	*Aechmophrus clarkii*	u	----			
Pelicans and Cormorants	American White Pelican	*Pelecanus erythrorhynchos*	u	Migrant			●
	Double-crested Cormorant	*Phalacrocorax auritus*	l	Resident			●
Bitterns, Herons, and Egrets	American Bittern	*Botaurus lentiginosus*	p	Resident			●
	Least Bittern	*Ixobrychus exilis*	p	Resident			●
	Great Blue Heron	*Ardea herodias*	l	Resident		●	●
	Great Egret	*Casmerodius albus*	l	Resident			●
	Snowy Egret	*Egretta thula*	u	----			●
	Little Blue Heron	*Egretta caerulea*	u	----			●
	Cattle Egret	*Bubulcus ibis*	u	----	●		●
	Green Heron	*Butorides striatus*	l	Resident		●	●
	Black-crowned Night-Heron	*Nycticorax nycticorax*	l	Resident			●
	Yellow-crowned Night-Heron	*Nycticorax violaceus*	p	----		●	●
Vultures	Turkey Vulture	*Cathartes aura*	l	Migrant		●	

	Common Name	*Scientific Name*	Occurrence	Migrant Resident	Prairie	Deciduous Forest	Water/ Wetland
Swans, Geese, and Ducks	Greater White-fronted Goose	*Anser albifrons*	p	Migrant			
	Snow Goose	*Chen caerulescens*	p	Migrant			
	Ross's Goose	*Chen rossii*	u	----			
	Canada Goose	*Branta canadensis*	l	Resident			●
	Mute Swan	*Cygnus olor*	u	Migrant			
	Trumpeter Swan	*Cygnus buccinator*	u	Migrant			●
	Tundra Swan	*Cygnus columbianus*	l	Migrant			
	Wood Duck	*Aix sponsa*	l	Resident		●	●
	Gadwall	*Anas strepera*	p	Resident			●
	American Wigeon	*Anas americana*	l	Migrant			●
	American Black Duck	*Anas rubripes*	p	Migrant			●
	Mallard	*Anas platyrhynchos*	l	Resident			●
	Blue-winged Teal	*Anas discors*	l	Resident			●
	Cinnamon Teal	*Anas cyanoptera*	u	Migrant			
	Northern Shoveler	*Anas clypeata*	l	Resident			●
	Northern Pintail	*Anas acuta*	l	Resident			●
	Green-winged Teal	*Anas crecca*	l	Migrant			●
	Canvasback	*Aythya valisineria*	l	Resident			●
	Redhead	*Aythya americana*	l	Resident			●
	Ring-necked Duck	*Aythya collaris*	l	Resident			●
	Greater Scaup	*Aythya marila*	l	Migrant			
	Lesser Scaup	*Aythya affinis*	p	Migrant			●
	Harlequin Duck	*Histrionicus histrionicus*	u	----			
	Surf Scoter	*Melanitta perspicillata*	u	----			
	White-winged Scoter	*Melanitta fusca*	u	----			
	Black Scoter	*Melanitta nigra*	u	----			
	Oldsquaw	*Clangula hyemalis*	u	Migrant			
	Bufflehead	*Bucephala albeola*	l	Resident			●
	Common Goldeneye	*Bucephala clangula*	p	Migrant			●

	Common Name	*Scientific Name*	Occurrence	Migrant	Prairie	Deciduous	Water/
				Resident		Forest	Wetland
	Hooded Merganser	*Lophodytes cucullatus*	l	Resident			●
	Common Merganser	*Mergus merganser*	l	Migrant			●
	Red-breasted Merganser	*Mergus serrator*	p	Migrant			●
	Ruddy Duck	*Oxyura jamaicensis*	l	Resident			●
Ospreys, Eagles, Harriers	Osprey	*Pandion haliaetus*	l	Migrant			●
and Hawks	Bald Eagle	*Haliaeetus leucocephalus*	l	Migrant			●
	Northern Harrier	*Circus cyaneus*	p	Resident	●		
	Sharp-shinned Hawk	*Accipiter striatus*	l	Migrant			
	Cooper's Hawk	*Accipiter cooperi*	l	Resident		●	
	Northern Goshawk	*Accipiter gentilis*	u	----			
	Red-shouldered Hawk	*Buteo lineatus*	p	Resident		●	
	Broad-winged Hawk	*Buteo playtypterus*	l	Resident		●	
	Swainson's Hawk	*Buteo swainsoni*	p	Migrant	●		
	Red-tailed Hawk	*Buteo jamaicensis*	l	Resident			
	Ferruginous Hawk	*Buteo regalis*	u	----			
	Rough-legged Hawk	*Buteo lagopus*	u	----			
	Golden Eagle	*Aquila chrysaetos*	u	----			
	American Kestrel	*Falco sparverius*	l	Resident	●		
	Merlin	*Falco columbarius*	u	----			
	Gyrfalcon	*Falco rusticolus*	u	----			
	Peregrine Falcon	*Falco peregrinus*	u	----	●		
	Prairie Falcon	*Falco mexicanus*	u	----			
Partriges, Pheasants,	Gray Partridge	*Peridix perdix*	p	Resident	●		
Grouse, Turkeys, and Quails	Ring-necked Pheasant	*Phaisanus colchicus*	l	Resident	●		
	Ruffed Grouse	*Bonasa umbellus*	u	Resident		●	
	Spruce Grouse	*Dendragapus canadensis*	u	----			
	Sharp-tailed Grouse	*Tympanuchus phasianellus*	u	----	●	●	
	Greater Prairie-Chicken	*Tympanuchus cupido*	u	----	●		
	Wild Turkey	*Meleagris gallopavo*	l	Resident		●	

	Common Name	*Scientific Name*	Occurrence	Migrant	Prairie	Deciduous	Water/
				Resident		Forest	Wetland
	Northern Bobwhite	*Colinus virginianus*	u	----	●		
Railes, Coots and Cranes	Yellow Rail	*Coturnicops noveboracensis*	p	----			●
	Virginia Rail	*Rallus limicola*	p	Resident			●
	Sora	*Porzana carolina*	p	Resident			●
	Common Moorhen	*Gallinula chloropus*	p	Migrant			●
	American Coot	*Fulica americana*	l	Resident			●
	Sandhill Crane	*Grus canadensis*	l	----			●
Plovers and Avocets	Black-bellied Plover	*Pluvialis squatarola*	u	----			
	Lesser Golden-Plover	*Pluvialis dominica*	u	----			
	Semipalmated Plover	*Charadrius semipalmatus*	u	----			
	Piping Plover	*Charadrius melodus*	u	----			●
	Killdeer	*Charadrius vociferus*	l	Resident	●		
	American Avocet	*Recurvirostra americana*	u	----			●
Sandpipers, Godwits,	Greater Yellowlegs	*Tringa melanoleuca*	p	Migrant			
Snipes, Woodcocks and	Lesser Yellowlegs	*Tringa flavipes*	u	Migrant			
Phalaropes	Solitary Sandpiper	*Tringa solitaria*	u	----			
	Willet	*Catoptrophorus semipalmatus*	u	----			
	Spotted Sandpiper	*Actitis macularia*	p	Resident			●
	Upland Sandpiper	*Bartramia longicauda*	u	Resident	●		
	Whimbrel	*Numenius phaeopus*	u	Migrant			
	Hudsonian Godwit	*Limosa haemastica*	u	----			
	Marbled Godwit	*Limosa fedoa*	u	----	●		
	Ruddy Turnstone	*Arenaria interpres*	u	----			
	Red Knot	*Calidris canutus*	u	----			
	Sanderling	*Calidris alba*	u	----			
	Semipalmated Sandpiper	*Calidris pusilla*	u	----			
	Least Sandpiper	*Calidris minutilla*	u	----			
	White-rumped Sandpiper	*Calidris fuscicollis*	u	----			
	Baird's Sandpiper	*Calidris bairdii*	u	----			
	Pectoral Sandpiper	*Calidris melanotos*	u	----			

	Common Name	*Scientific Name*	Occurrence	Migrant Resident	Prairie	Deciduous Forest	Water/ Wetland
	Dunlin	*Calidris alpina*	u	----			
	Stilt Sandpiper	*Calidris himantopus*	u	----			
	Buff-breasted Sandpiper	*Tryngites subruficollis*	u	----			
	Short-billed Dowitcher	*Limnodromus griseus*	u	----			
	Long-billed Dowitcher	*Limnodromus scolopaceus*	u	----			
	Common Snipe	*Gallinago gallinago*	l	Resident			●
	American Woodcock	*Scolopax minor*	l	Resident		●	
	Wilson's Phalarope	*Phalaropus tricolor*	u	----			●
	Red-necked Phalarope	*Phalaropus lobatus*	u	----			
	Parasitic Jaeger	*Stercorarius parasiticus*	u	----			
Gulls and Terns	Franklin's Gull	*Larus pipixcan*	u	----			●
	Little Gull	*Larus minutus*	u	----			
	Bonaparte's Gull	*Larus philadelphia*	u	----			
	Ring-billed Gull	*Larus delawarensis*	l	----			●
	Herring Gull	*Larus argentatus*	u	----			●
	Thayer's Gull	*Larus thayeri*	u	----			
	Iceland Gull	*Larus glaucoides*	u	----			
	Lesser Black-backed Gull	*Larus fuscus*	u	----			
	Glaucous Gull	*Larus hyperboreus*	u	----			
	Great Black-backed Gull	*Larus marinus*	u	----			
	Caspian Tern	*Sterna caspia*	u	----			●
	Common Tern	*Sterna hirundo*	u	----			●
	Forster's Tern	*Sterna forsteri*	u	Resident			●
	Black Tern	*Childonias niger*	u	Resident			●
Pigeons and Doves	Rock Dove	*Columbia livia*	l	Resident	●		
	Mourning Dove	*Zenaida macroura*	l	Resident	●		
Cuckoos	Black-billed Cuckoo	*Coccyzus erythropthalmus*	p	Resident		●	
	Yellow-billed Cuckoo	*Coccyzus americanus*	p	Resident		●	
Owls	Eastern Screech-Owl	*Ottus asio*	p	Resident		●	
	Great Horned Owl	*Bubo virginianus*	p	Resident		●	

	Common Name	*Scientific Name*	Occurrence	Migrant	Prairie	Deciduous	Water/
				Resident		Forest	Wetland
	Snowy Owl	*Nyctea scandiaca*	u	----			
	Northern Hawk Owl	*Surnia ulula*	u	----			
	Barred Owl	*Strix varia*	l	Resident		●	
	Great Gray Owl	*Strix nebulosa*	u	----			
	Long-eared Owl	*Asio otus*	p	Resident		●	
	Short-eared Owl	*Asio flammeus*	u	----	●		
	Boreal Owl	*Aegolius funereus*	u	----			
	Northern Saw-whet Owl	*Aegolius acadicus*	u	----			
Goatsuckers	Common Nighthawk	*Chordeiles minor*	p	Resident	●		
	Whip-poor-will	*Caprimulgus vociferus*	p	Resident		●	
Swifts and Hummingbirds	Chimney Swift	*Chaetura pelagica*	u	Resident			
	Ruby-throated Hummingbird	*Archilochus colubris*	l	Resident		●	
Kingfishers	Belted Kingfisher	*Ceryle alcyon*	p	Resident			●
Woodpeckers	Red-headed Woodpecker	*Melanerpes erythrocephalus*	l	Resident		●	
	Red-bellied Woodpecker	*Melanerpes carolinus*	l	Resident		●	
	Yellow-bellied Sapsucker	*Sphytrapicus varius*	l	Resident		●	
	Downy Woodpecker	*Picoides pubescens*	l	Resident		●	
	Hairy Woodpecker	*Picoides villosus*	l	Resident		●	
	Three-toed Woodpecker	*Picoides tridactylus*	u	----			
	Black-backed Woodpecker	*Picoides arcticus*	u	----			
	Northern Flicker	*Colaptes auratus*	l	Resident		●	
	Pileated Woodpecker	*Dryocopus pileatus*	p	Resident		●	
Flycatchers	Olive-sided Flycatcher	*Contopus borealis*	u	----			
	Eastern Wood-Pewee	*Contopus virens*	l	Resident		●	
	Yellow-bellied Flycatcher	*Empidonax flaviventris*	u	----			
	Acadian Flycatcher	*Empidonax virescens*	u	----		●	
	Alder Flycatcher	*Empidonax alnorum*	u	Migrant			●
	Willow Flycatcher	*Empidonax trailii*	p	Resident			●
	Least Flycatcher	*Empidonax minimus*	l	Resident		●	
	Eastern Phoebe	*Sayornis nigricans*	l	Resident		●	

	Common Name	*Scientific Name*	Occurrence	Migrant	Prairie	Deciduous	Water/
				Resident		Forest	Wetland
	Great Crested Flycatcher	*Myiarchus critinus*	l	Resident			
	Western Kingbird	*Tyrannus verticalis*	p	Migrant	●		
	Eastern Kingbird	*Tyrannus tyrannus*	l	Resident	●		
Jays, Magpies, and Crows	Gray Jay	*Perisoreus canadensis*	u	----			
	Blue Jay	*Cyanatta cristata*	l	Resident		●	
	Black-billed Magpie	*Pica pica*	u	----			
	American Crow	*Corvus brachyrhynchos*	l	Resident		●	
	Common Raven	*Corvus corax*	u	----			
Larks and Swallows	Horned Lark	*Eremophila alpestris*	u	Resident	●		
	Purple Martin	*Progne subis*	p	Resident	●		●
	Tree Swallow	*Tachycineta bicolor*	l	Resident			●
	Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	l	Resident	●		●
	Bank Swallow	*Riparia riparia*	u	Resident	●		●
	Cliff Swallow	*Hirundo pyrrhonota*	u	Resident	●		●
	Barn Swallow	*Hirundo rustica*	l	Resident	●		●
Chickadees and Titmice	Black-capped Chickadee	*Parus artricapillus*	l	Resident		●	
	Boreal Chickadee	*Parus hudsonicus*	u	----			
	Tufted Titmouse	*Parus bicolor*	u	----		●	
Nuthatches and Creepers	Red-breasted Nuthatch	*Sitta canadensis*	p	Migrant			
	White-breasted Nuthatch	*Sitta carolinensis*	l	Resident			
	Brown Creeper	*Certhia americana*	l	Migrant		●	
	Carolina Wren	*Thryothorus ludovicianus*	u	Migrant			
	House Wren	*Troglodytes aedon*	u	Resident		●	
	Winter Wren	*Troglodytes troglodytes*	u	----			
	Sedge Wren	*Cistothorus platensis*	l	Resident			●
	Marsh Wren	*Cistothorus palustris*	l	Resident			●
Kinglets, Gnatcatchers,	Golden-crowned Kinglet	*Regulus satrapa*	u	Migrant			
and Thrushes	Ruby-crowned Kinglet	*Regulus calendula*	u	Migrant			
	Blue-gray Gnatcatcher	*Polioptila caerulea*	l	Migrant		●	

	Common Name	*Scientific Name*	Occurrence	Migrant Resident	Prairie	Deciduous Forest	Water/ Wetland
	Eastern Bluebird	*Sialia sialis*	l	Resident			
	Mountain Bluebird	*Sialia currucoides*	u	Migrant			
	Townsend's Solitaire	*Myadestes townsendi*	u	----			
	Veery	*Catharus fuscescens*	l	Migrant		●	
	Gray-cheeked Thrush	*Catharus minimus*	u	----			
	Swainson's Thrush	*Catharus ustulatus*	u	----			
	Hermit Thrush	*Catharus guttatus*	u	----			
	Wood Thrush	*Hylocichla mustelina*	l	Migrant		●	
	American Robin	*Turdus migratorius*	l	Resident			
	Varied Thrush	*Ixoreus naevius*	u	----			
Catbirds, Mockingbirds,	Gray Catbird	*Dumetella carolinensis*	l	Resident			
and Thrashers	Northern Mockingbird	*Mimus polyglottos*	u	----			
	Brown Thrasher	*Toxostoma rufum*	l	Resident			
Starlings and Vireos	European Starling	*Sturnus vulgaris*	l	Resident			
Pipets, Waxwings,	Water Pipit	*Anthus spinoletta*	u	----			
and Shrikes	Bohemian Waxwing	*Bombycilla garrulus*	u	----			
	Loggerhead Shrike	*Lanius ludovicianus*	p	Migrant	●		
	Northern Shrike	*Lanius excubitor*	p	----			
	Bell's Vireo	*Vireo bellii*	p	Migrant			
	Yellow-throated Vireo	*Vireo flavifrons*	l	Resident		●	
	Warbling Vireo	*Vireo gilvus*	l	Resident			
	Philadelphia Vireo	*Vireo philadelphicus*	u	----		●	
	Red-eyed Vireo	*Vireo olivaceus*	l	Resident		●	
	Cedar Waxwing	*Bombycilla cedrorum*	l	Resident			
Warblers and Tanagers	Blue-winged Warbler	*Vemivora pinus*	l	Migrant		●	
	Golden-winged Warbler	*Vermivora chrysoptera*	p	----		●	
	Tennessee Warbler	*Vermivora peregrina*	u	Migrant			
	Orange-crowned Warbler	*Vermivora celata*	u	Migrant			
	Nashville Warbler	*Vermivora ruficapilla*	p	Migrant			
	Northern Parula	*Parula americana*	u	----			

	Common Name	*Scientific Name*	Occurrence	Migrant	Prairie	Deciduous	Water/
				Resident		Forest	Wetland
	Yellow Warbler	*Dendroica petechia*	l	Resident			
	Chestnut-sided Warbler	*Dendroica pensylvanica*	p	Migrant		●	
	Magnolia Warbler	*Dendroica magnolia*	u	Migrant			
	Cape May Warbler	*Dendroica tigrina*	u	----			
	Black-throated Blue Warbler	*Dendroica caerulescens*	u	----		●	
	Yellow-rumped Warbler	*Dendroica coronata*	l	Migrant			
	Black-throated Green Warbler	*Dendroica virens*	u	----			
	Blackburnian Warbler	*Dendroica fusca*	u	----			
	Pine Warbler	*Dendroica pinus*	p	----			
	Palm Warbler	*Dendroica palmarum*	u	Migrant			
	Bay-breasted Warbler	*Dendroica castanea*	u	----			
	Blackpoll Warbler	*Dendroica striata*	u	Migrant			
	Cerulean Warbler	*Dendroica cerulea*	l	Migrant		●	
	Black-and-white Warbler	*Mniotilta varia*	p	Migrant		●	
	American Redstart	*Setophaga ruticilla*	l	Resident		●	
	Prothonotary Warbler	*Protonotaria citrea*	p	Migrant		●	
	Worm-eating Warbler	*Helmitheros vermivorus*	u	----			
	Ovenbird	*Seiurus aurocapillus*	l	Resident		●	
	Northern Waterthrush	*Seiurus noveboracensis*	u	Migrant		●	
	Louisiana Waterthrush	*Seiurus motacilla*	p	Migrant		●	
	Kentucky Warbler	*Oporornis formosus*	u	----		●	
	Connecticut Warbler	*Oporonis agilis*	u	----			
	Mourning Warbler	*Oporonis philadelphia*	p	Migrant		●	
	Common Yellowthroat	*Geothylpis trichas*	l	Resident			
	Hooded Warbler	*Wilsonia citrina*	u	----		●	
	Wilson's Warbler	*Wilsonia pusilla*	u	Migrant			
	Canada Warbler	*Wilsonia canadensis*	u	Migrant		●	
	Yellow-breasted Chat	*Icteria virens*	u	----			
	Summer Tanager	*Piranga rubra*	u	----			
	Scarlet Tanager	*Pirango olivacea*	l	Resident		●	

	Common Name	*Scientific Name*	Occurrence	Migrant	Prairie	Deciduous	Water/
				Resident		Forest	Wetland
	Western Tanager	*Piranga ludoviciana*	u	----			
Towhees and Sparrows	Rufous-sided Towhee	*Pipilo erythrophtalmus*	p	Migrant			
	Green-tailed Towhee	*Pipilo chlorurus*	u	----			
	American Tree Sparrow	*Spizella arborea*	u	Migrant			
	Chipping Sparrow	*Spizella passerina*	l	Resident		●	
	Clay-colored Sparrow	*Spizella pallida*	l	Resident	●		
	Field Sparrow	*Spizella pusilla*	l	Resident	●		
	Vesper Sparrow	*Pooecetes gramineus*	l	Resident	●		
	Lark Sparrow	*Chondestes grammacus*	p	Migrant	●		
	Savannah Sparrow	*Passerculus sandwichensis*	p	Resident	●		
	Grasshopper Sparrow	*Ammondramus savannarum*	p	Resident	●		
	Henslow's Sparrow	*Ammondramus henslowii*	u	----	●		
	Le Conte's Sparrow	*Ammodramus leconteii*	u	----			●
	Sharp-tailed Sparrow	*Ammodramus caudacutus*	u	----			
	Fox Sparrow	*Passerella iliaca*	l	Migrant			
	Song Sparrow	*Melospiza melodia*	l	Resident			
	Lincoln's Sparrow	*Melospiza lincolnii*	u	----			
	Swamp Sparrow	*Melospiza georgiana*	l	Resident			●
	White-throated Sparrow	*Zonotrichia albicollis*	l	Migrant			
	Harris's Sparrow	*Zonotrichia querula*	u	Migrant			
	White-crowned Sparrow	*Zonotrichia albicollis*	u	Migrant			
	Dark-eyed Junco	*Junco hyemalis*	l	Migrant			
Grosbeaks and Buntings	Snow Bunting	*Plectrophenax nivalis*	u	Migrant			
	Northern Cardinal	*Cardinalis cardinalis*	l	Resident			
	Rose-breasted Grosbeak	*Pheucticus ludovicianus*	l	Resident		●	
	Blue Grosbeak	*Guiraca caerulea*	u	----			
	Indigo Bunting	*Passerina cyanea*	l	Resident		●	
	Dickcissel	*Spiza americana*	p	Resident	●		
Longspurs and Blackbirds	Bobolink	*Dolichonyx oryzivorus*	p	Resident	●		
	Lapland Longspur	*Calcarius lapponicus*	u	----			

	Common Name	*Scientific Name*	Occurrence	Migrant	Prairie	Deciduous	Water/
				Resident		Forest	Wetland
	Smith's Longspur	*Calcarius pictus*	u	----			
	Chestnut-collared Longspur	*Calcaris ornatus*	u	----	●		
	Red-winged Blackbird	*Agelaius phoeniceus*	l	Resident			●
	Eastern Meadowlark	*Sturnella magna*	p	Resident	●		
	Western Meadowlark	*Sturnella neglecta*	p	Resident	●		
	Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	l	Resident			●
	Rusty Blackbird	*Euphagus carolinus*	u	Migrant			
	Brewer's Blackbird	*Euphagus cyanocephalus*	p	Resident	●		
	Common Grackle	*Quiscalus quiscula*	l	Resident			
	Brown-headed Cowbird	*Molothrus ater*	l	Resident			
	Orchard Oriole	*Icterus spurius*	p	Resident			
	Northern Oriole	*Icterus galbula*	l	Resident		●	
	Pine Grosbeak	*Pinicola enucleator*	u	----			
Finches	Purple Finch	*Carpodacus purpureus*	p	Migrant			
	House Finch	*Carpodacus mexicanus*	l	Resident	●	●	
	Red Crossbill	*Loxia curvirostra*	u	----			
	White-winged Crossbill	*Loxia leucoptera*	u	----			
	Common Redpoll	*Carduelis flammea*	u	----			
	Hoary Redpoll	*Carduelis hornemanni*	u	----			
	Pine Siskin	*Carduelis pinus*	l	Migrant			
	American Goldfinch	*Carduelis tristis*	l	Resident			
	Evening Grosbeak	*Coccothraustes vespertinus*	u	----			
	House Sparrow	*Passer domesticus*	l	Resident			

u= Unlikely
p= Possible
l= Likely

APPENDIX E: DITCH HISTORY, ALIGNMENT AND PROFILE ANALYSIS

HISTORY

The first ditches constructed in the current 53-62 drainage area were built in 1890 and included County Ditch 9 and 10. County 9 was entirely within the current City of Blaine. County 10 was primarily within the current City of Lino Lakes but portions of the Main Line and Branch B were in Blaine. Figure 20 illustrates County 9 and 10.

In 1894 County Ditch 22 and 24 were constructed. County 22 is entirely within Lino Lakes and does not affect the current 53-62 system. County 24, also known as the Elwell Ditch, routed flows from County 9 to Golden Lake. Figure 21 illustrates County 22 and 24.

In 1898 County Ditch 32 was built. This was a very extensive ditch system that routed nearly all of the flow from the current 53-62 drainage area through Lino Lakes and the current 10-22-32 system. Figure 22 illustrates County 32.

County Ditch 53 was constructed in 1911. County 53 added many new branches to the existing 32 system and changed the flow direction for much of the drainage area to Golden Lake rather than through Lino Lakes. Figure 23 illustrates the alignment of County 53.

County Ditch 62 built in 1917 included minor modifications to ditch 53. From 1917 to the present, the ditch has been referred to as Anoka County Ditch 53-62.

Grade along the ditch is minimal with many stretches, some exceeding one mile in length, being completely flat. Aerial photographs reviewed (1938, 1945, 1953, 1957, 1966, 1968, 1973, 1974, 1987) showed much of the area served by ACD 53-62 being used for hay production. Land use within the ACD 53-62 drainage area has been changing since the 1980s. With conversion from agricultural to urban uses, the ditch has become increasingly relied upon for storm water conveyance and less importantly for providing agricultural drainage.

ACD 53-62 Maintenance and Modifications

Many changes have been made to ACD 53-62 since it was originally constructed. A latticework of private ditches has been dug by local landowners to improve drainage. In addition, landowners constructed many crossings along the ditch in order to readily access their fields. As the population continued to increase throughout the area, public road crossings were also built.

The most significant roadway crossing along ACD 53-62 is Interstate 35W. The interstate was built in the late 1960s and two 60-inch culverts were placed in the ditch to accommodate the new roadway. Other important road crossings that pre-date Interstate 35W are at Lake Drive and Lexington Avenue. There has been significant concern, especially on the part of landowners along the ditch, that the ditch bottom has accumulated sediment over time, which impedes drainage and therefore requires maintenance. Along with the maintenance concerns, there has been disagreement on the original, as-built profile of the ditch.

Figure 20: Anoka County Ditch 9 and 10

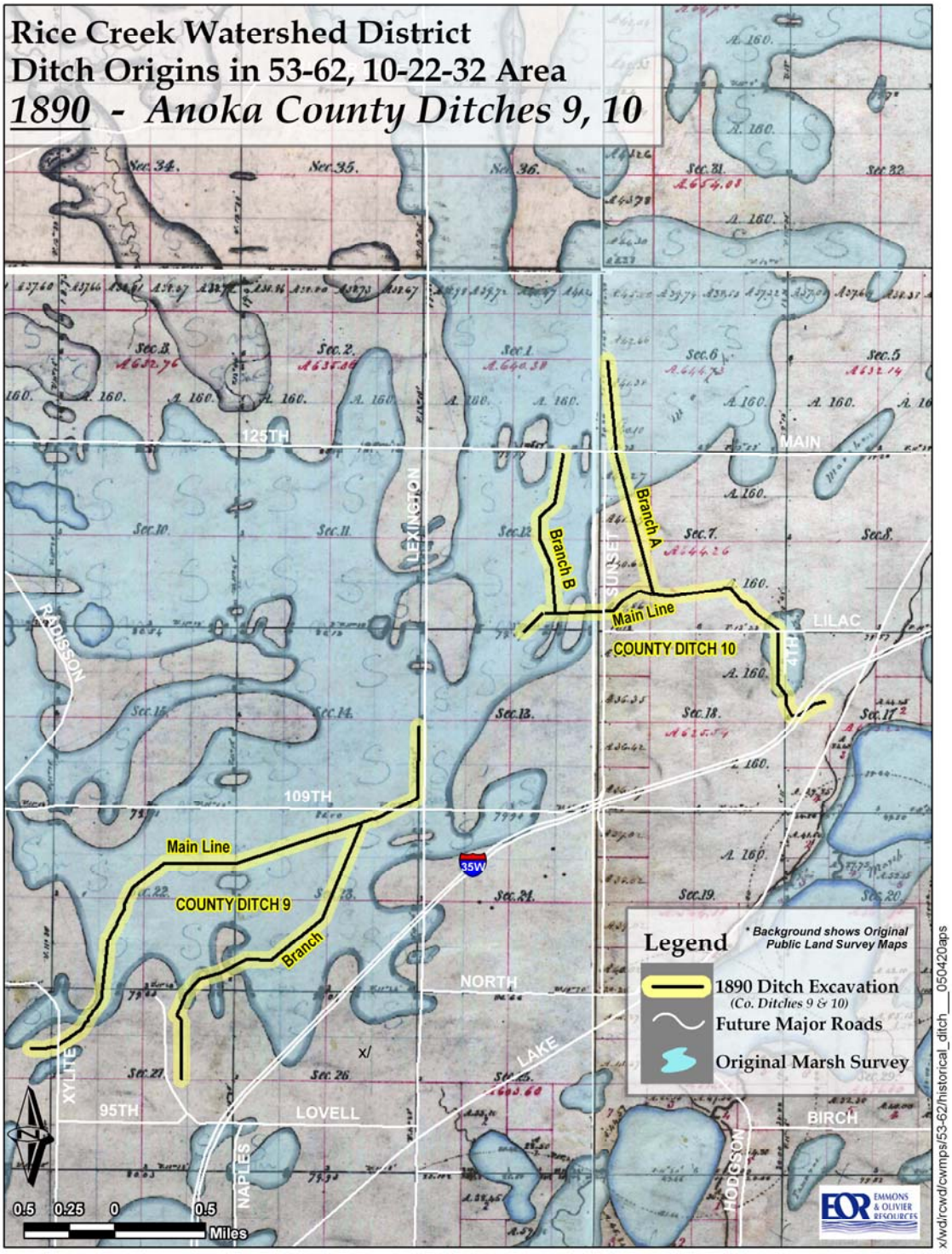


Figure 21: Anoka County Ditch 22 and 24

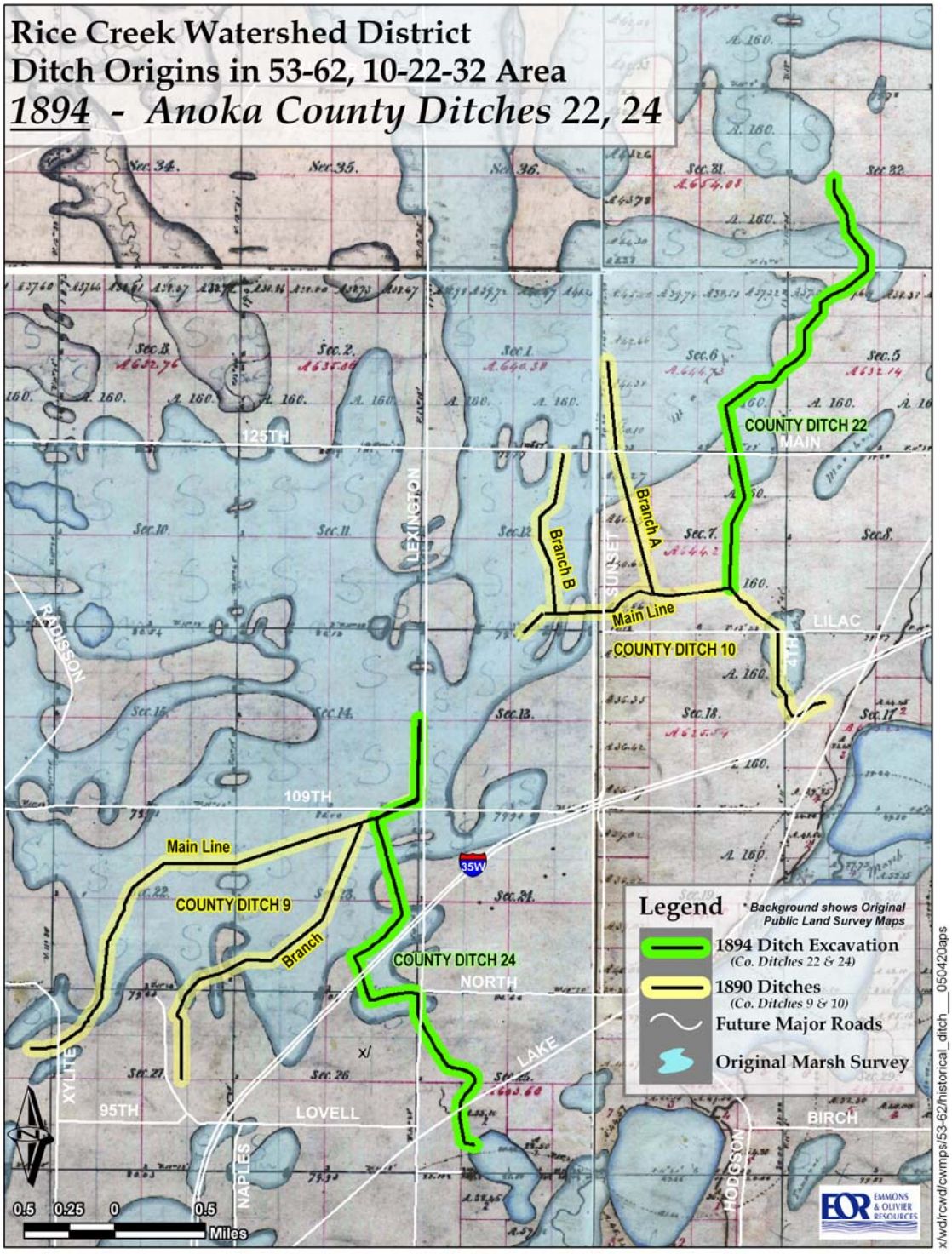


Figure 22: Anoka County Ditch 32

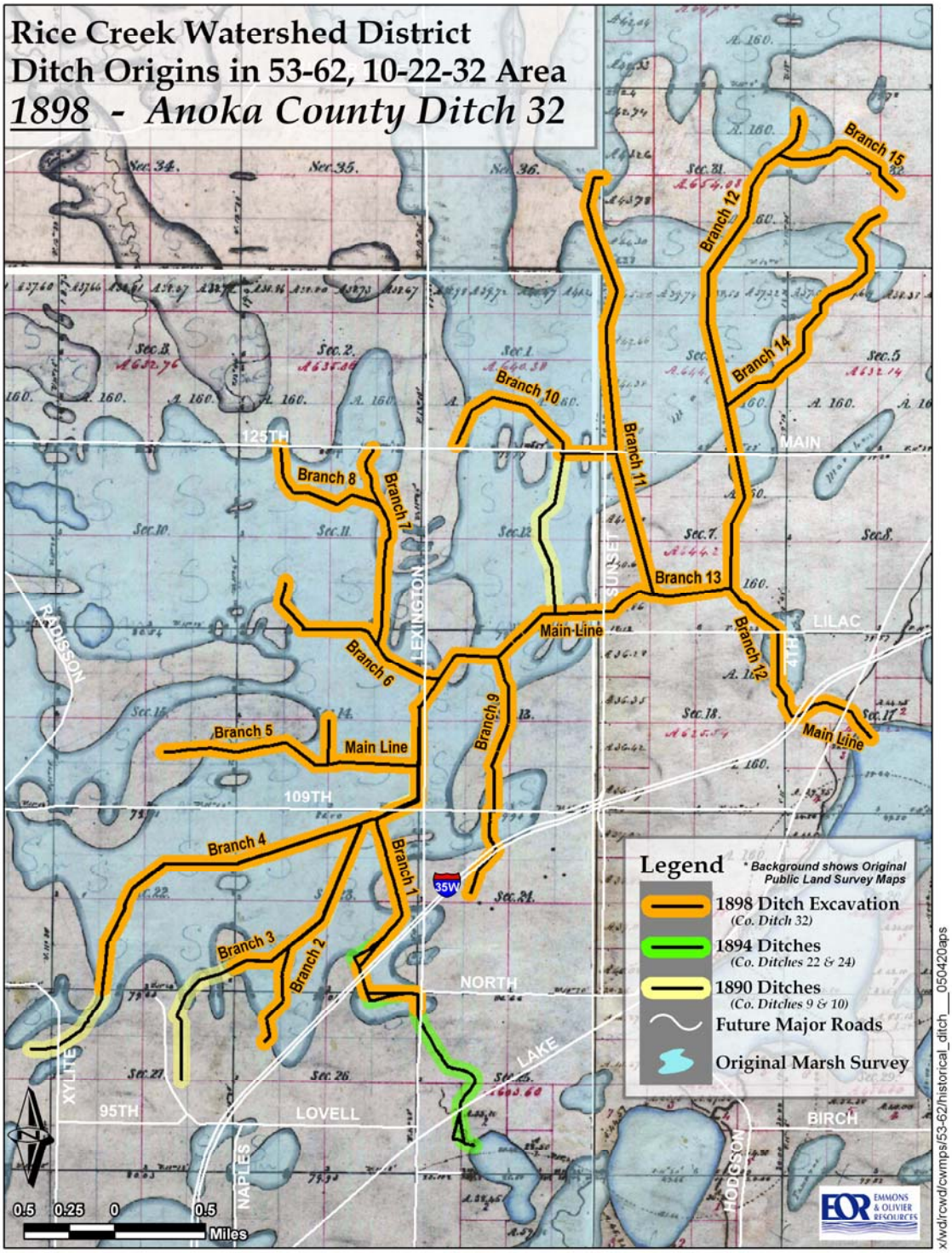


Figure 23: Anoka County Ditch 53

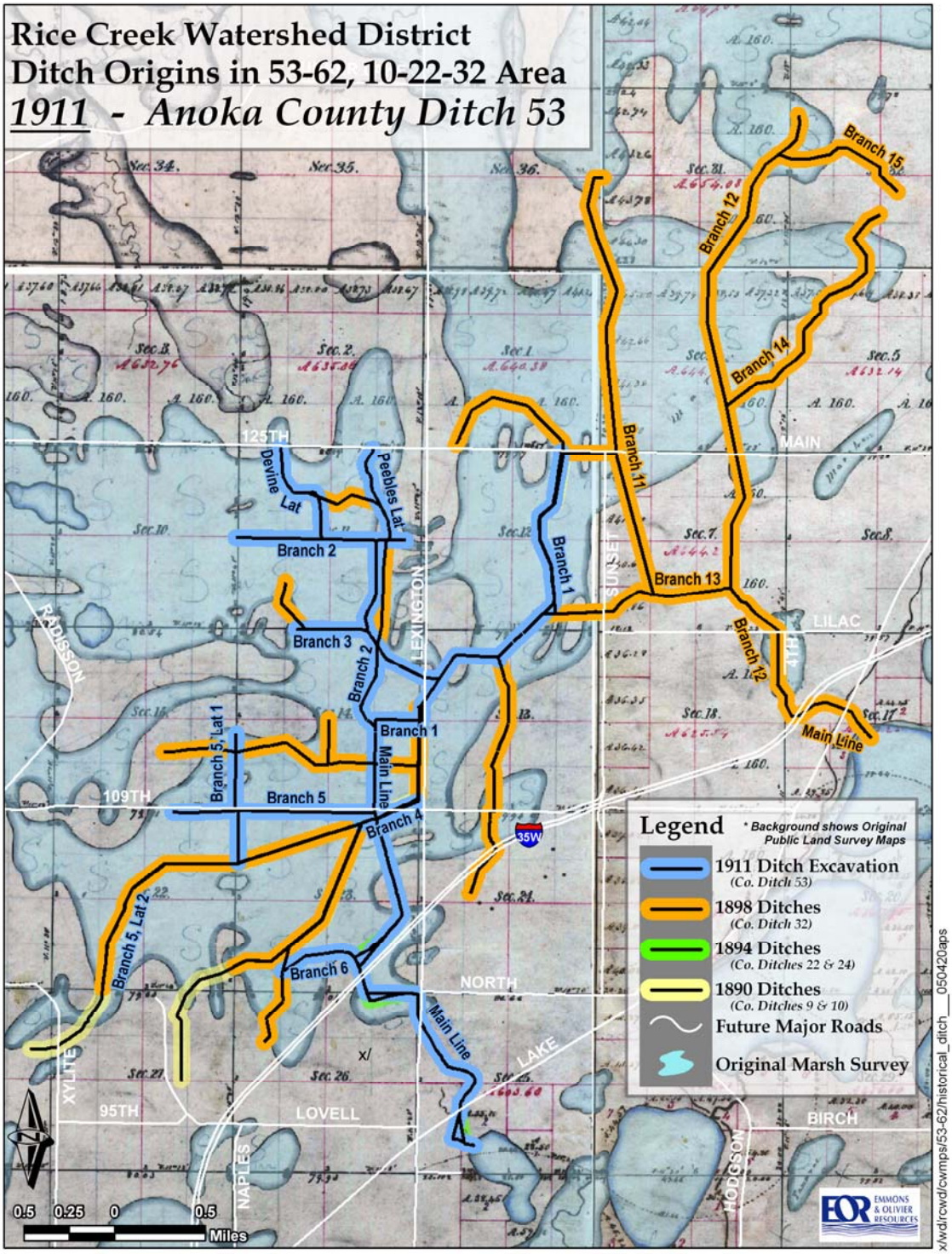
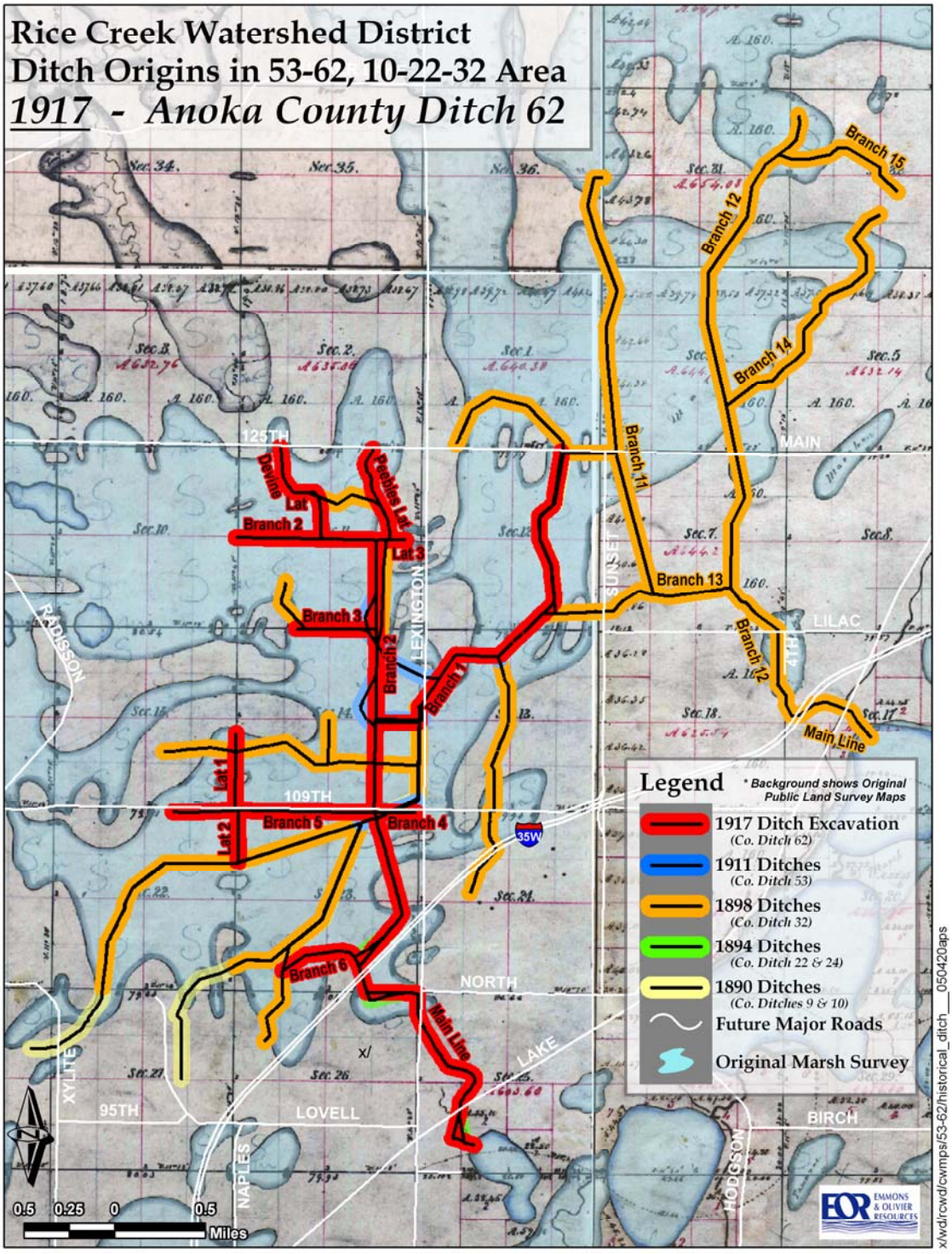


Figure 24: Anoka County Ditch 62



1997 Agreement
In a 1997 Agreement, the RCWD, City of Blaine, and landowners agreed upon a profile elevation for the ditch. An exhaustive effort was undertaken by the above parties to establish and agree upon an "official" ditch profile. Historic ditch records were interpreted, Anoka County Highway Department records were reviewed, and field surveys were conducted. All parties agreed that the ditch would be maintained and culverts established at an elevation of 891.46 feet for the flat portion of the public ditch between Interstate 35W and the Lexington Avenue crossing to the north.

Petition, Repair Report and Addenda
The RCWD petitioned itself for a repair of ACD 53-62 on June 11, 2003. The resulting Repair Report and Addenda investigated the profile elevation for the flat portion of the ditch between the two Lexington Avenue crossings. The July 16, 2003 report provided a detailed analysis of hydraulic modeling results and costs associated with a ditch repair. A comparison was made between a traditional repair at an elevation of 891.46 or a CWMP modeled at 891.46 ft. An addendum dated 10-31-03 was written that further investigated a repair profile of 890.00 ft. On November 12, 2003 the Board approved findings that the CWMP was the mechanism to be used to repair the ditch. In that same Order the profile of 891.46 for the flat portion of the ditch was adopted as the official profile.

July 17, 2003 Village Meadows CWMP
Resolution 04-01, approved by the RCWD Board on January 28, 2004 approved the CWMP as the mechanism to repair a portion of ACD 53-62. Approval by the Minnesota Board of Water and Soil Resources as a Comprehensive Wetland Protection and Management Plan was granted on April 28, 2004.

ADDITIONAL PROFILE ANALYSIS OF ACD 53-62

The remainder of this Appendix includes an analysis for the Branches of ACD 53-62. The adopted profile of 891.46 for the flat portion of the ditch was used to define the official profile of all the branches. Original construction plans were used to determine slope of each branch. Appendix E illustrates how the official profile relates to profiles surveyed in 2004, soil borings and original cut sheets.

Background
In 2003 the RCWD board established the flat portion of the Main Stem of ACD 53-62 at an elevation of 891.46 msl. The establishment of that elevation was the result of many years of contentious debate and research of available records. A complete record of events and analysis of technical data is presented in the July 16, 2003 Engineer's Repair Report and the October 31, 2003 Repair Report Addendum. This analysis presents the findings of a profile analysis for the branches of ACD-53-62.

Soil Borings
Soil borings were taken in late August of 2004 and early September 2004 by Rice Creek Watershed District staff. The borings were taken to aid in determining the official profile for Branches 1-6 and their laterals for Anoka County Ditches 53-62. The original plan called for

17 locations to have borings taken, however boring numbers 8, 9, and 16 were not taken due to site difficulties, prioritization, and likelihood of useful results.

At each location, two borings were taken; one in the ditch, and one about 50' outside of the ditch. Two points were labeled at each boring; one taken at the ground surface and the other, the "depth to sand" distance was measured from the ground surface to the interface between the original material and the alluvial deposition (Table 12).

Of the 14 locations where borings were taken in 2004, four were taken in Branch 1, two in Branch 1, Lateral 1, one in Branch 2, one in Branch 2, Peebles Lateral, and six in Branch 5, Lateral 2 (Figure 25).

The data obtained from the 2004 soil borings was then used to create ditch system profiles and cross-sections at locations where soil borings were taken. The profile sheets display the surveyed 2004 centerline (CL) ditch elevations, with an average elevation for the centerline entered every 1000 feet. This represents the current ditch profile. Also on the profile sheets are the profiles based on the flat portion of the Main Trunk official elevation of 891.46 feet.

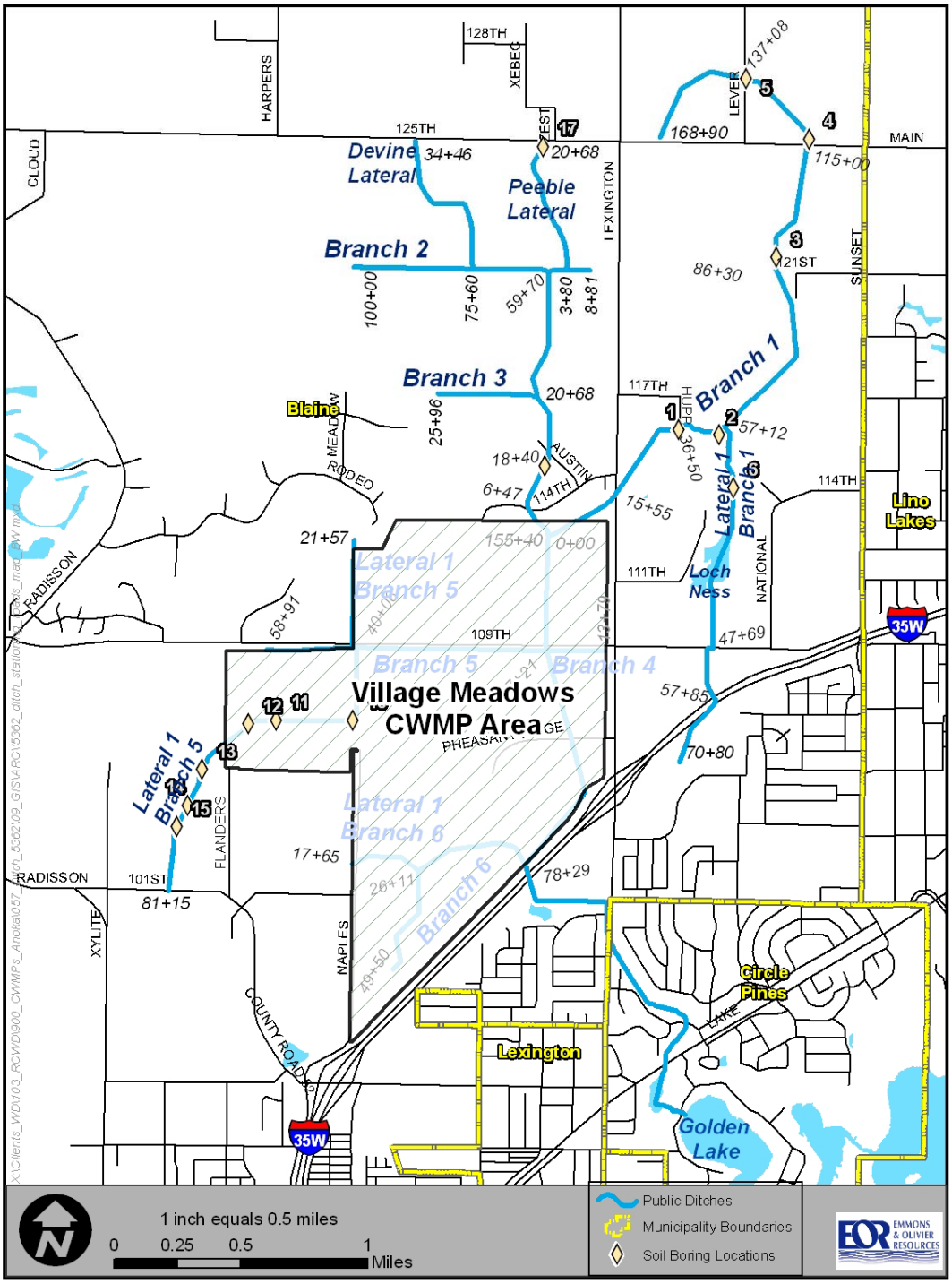
The soil borings taken were fairly limited in scope and number for a couple of reasons. The main reason borings were not taken on every branch and every lateral was the type of soils present in those locations. Many of the branches and laterals in the ditch system have soils composed primarily of peat. These branches would likely have highly variable results and provide little indication of the actual elevation of the official profile. The effort was concentrated in areas with sandy soils. The plan was to take fewer borings, and yield more accurate results instead of taking lots of borings with limited validity.

Table 13: Survey Data Used to Determine Soil Interface

.

Point #	Depth to Sand [ft]	Position	Ground Elevation [ft]	Elevation at Sand [ft]	Boring #
1596	0.5	Ditch	897.021	896.52	17
1597	N/A	Outside	899.862	899.86	
3785	0.7	Ditch	896.473	895.77	4
3786	N/A	Outside	897.105	897.11	
3926	0.65	Ditch	897.101	896.45	5
3926	0.65	Ditch	897.101	896.45	
3927	1	Ditch	900.49	899.49	13
3925	N/A	Outside	897.718	897.72	
3929	1.42	Ditch	901.46	900.04	14
3930	1.33	Outside	903.01	901.68	
3932	1.42	Ditch	901.18	899.76	15
3931	1.42	Outside	903.25	901.83	
3933	1.83	Ditch	898.46	896.63	12
3934	2	Outside	900.64	898.64	
3938	1	Ditch	899.146	898.15	11
3939	2.08	Outside	901.125	899.04	
3943	1.25	Ditch	897.01	895.76	10
3942	1.83	Outside	898.149	896.32	
4088	0.5	Ditch	895.211	894.71	7
4087	1.5	Outside	899.891	898.39	
4102	1.8	Ditch	895.461	893.66	1
4101	1.3	Outside	898.582	897.28	
4059	0.3	Ditch	894.721	894.42	2
4058	1.6	Outside	898.045	896.45	
4057	0.2	Ditch	896.655	896.46	6
4056	0.5	Outside	897.879	897.38	
4061	1.1	Ditch	895.097	894.00	3
4060	1.4	Outside	899.867	898.47	

Figure 25: Stations and Soil Boring Locations along Ditch Branches



Cut Sheets

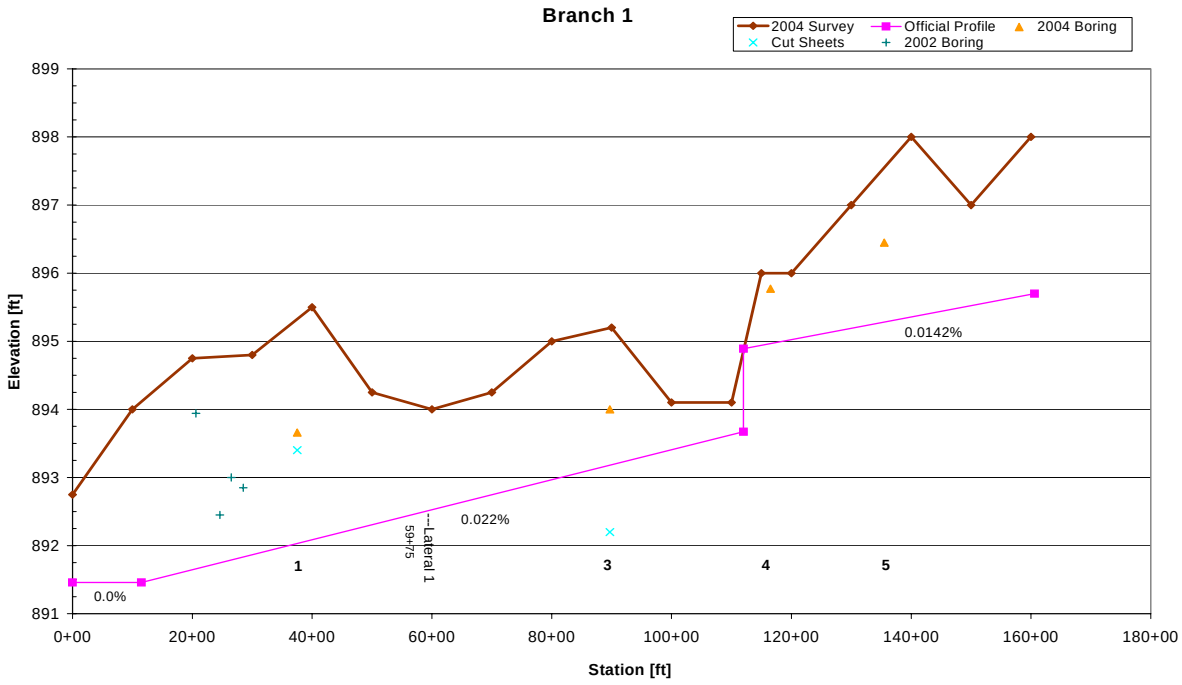
The plans for ACD 53, Engineer's Exhibit 2 had cut depths associated with initial ditch excavation. These depths represented the depth of cut required to be cut from the formerly existing ground surface. The elevations of the ground surface given on Exhibit 2 do not match with the current day surface levels, so the cut depths were subtracted from the elevation that appeared to be present day ground elevation. These cut sheets were only available for certain stations on a limited number of branches (only those in ditch 53). Another issue with using this elevation for guidance is that it will give an artificially low elevation for the ditch channel bottom because of the issue of subsidence. The elevation obtained from the cut depth was used more as a minimum ditch bottom elevation than anything else.

The original Engineer's Exhibit 2 also gave the dimensions of the channel. All of the branches and laterals shown on the cut sheets were shown having a bottom width of four feet and side slopes of 1:1. The only deviance from these channel dimensions was on Branch 2 from station 108+00 to 135+22, where no survey data or borings were taken. These slopes and bottom elevations were applied using the elevations obtained from analysis and are shown on the soil boring sheets. They have been examined to determine the feasibility that the interpreted side banks and top of bank could have evolved from the original construction.

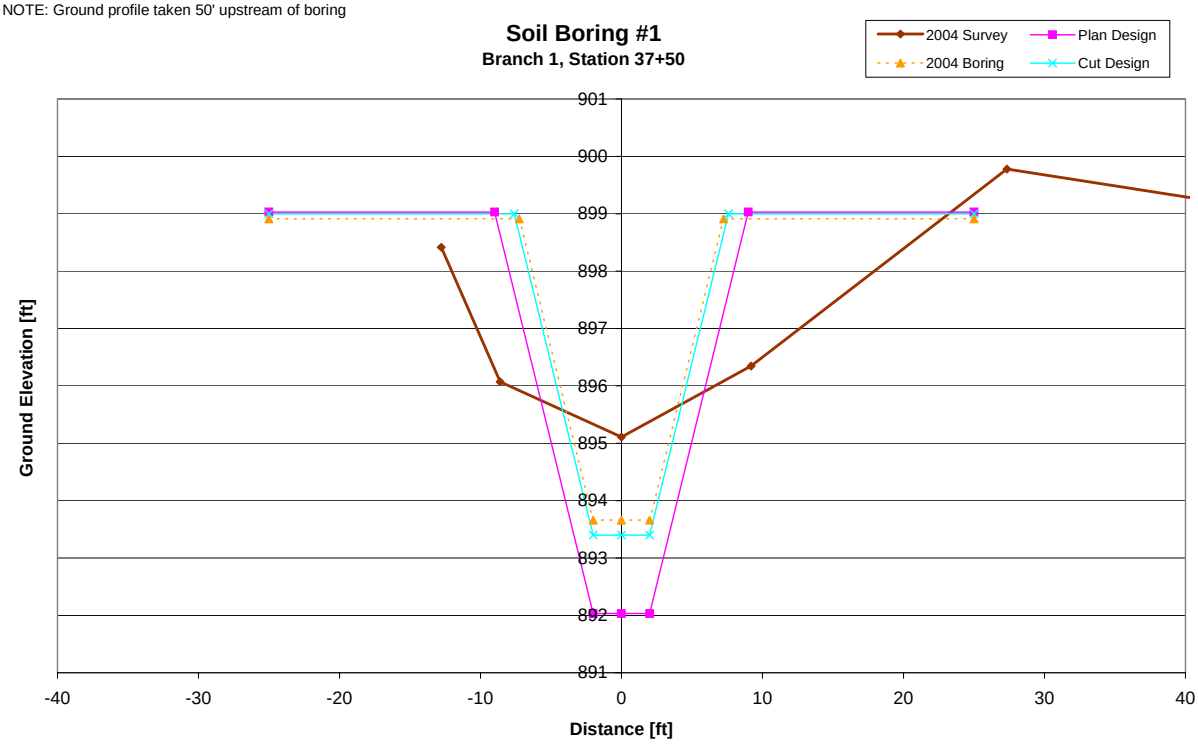
53-62 Branches Official Profile Assessment

Following is a list of the branches and their laterals for ACD 53-62. A profile is provided for all branches and a cross section is provided at each soil boring location.

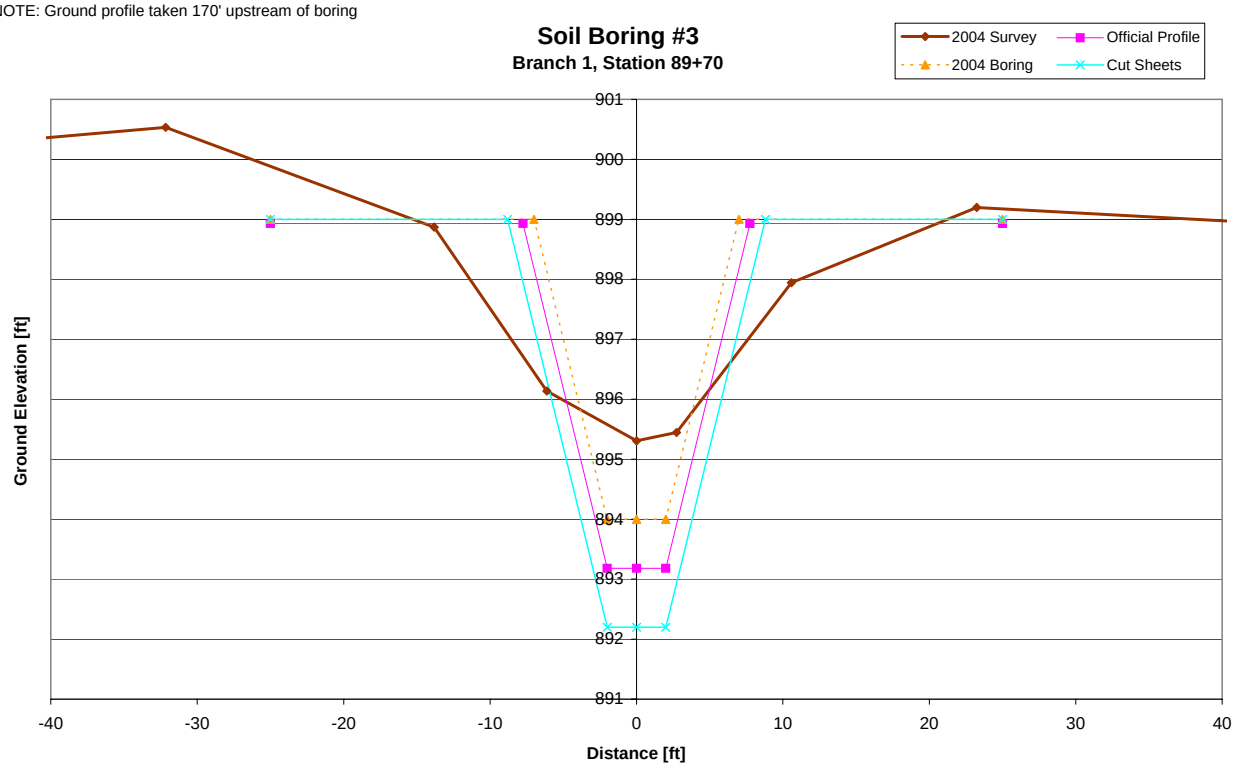
Branch 1

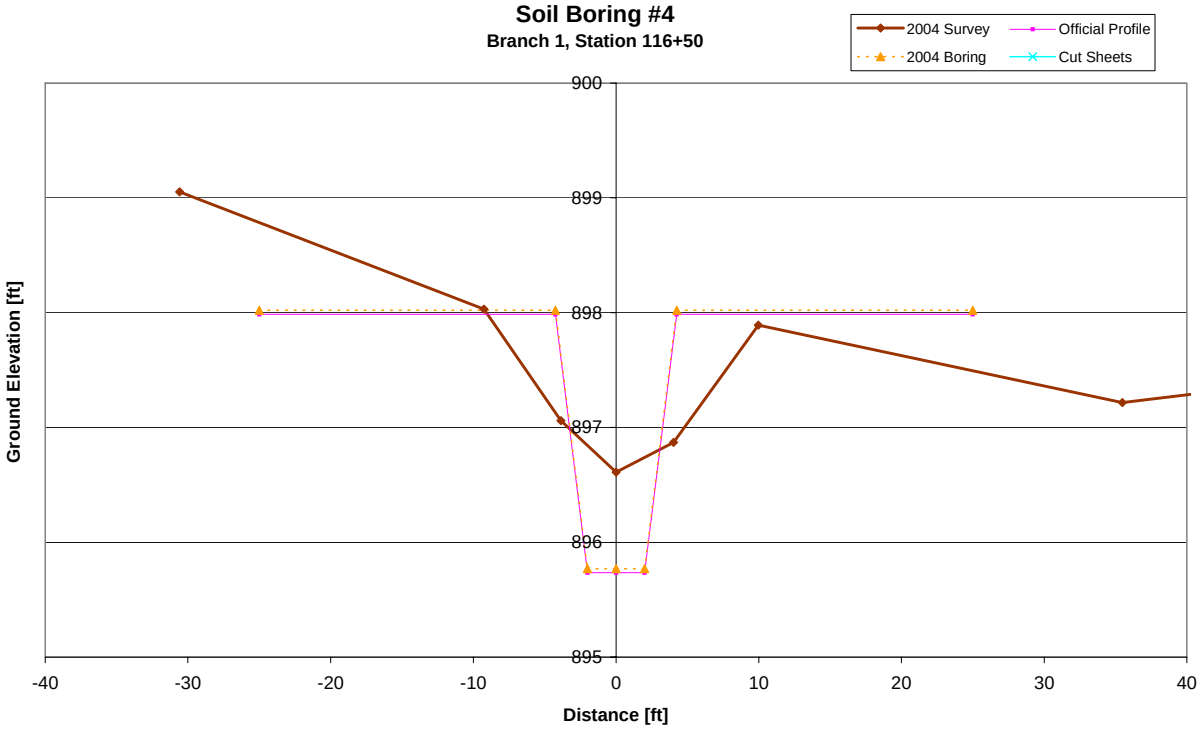


NOTE: Ground profile taken 50' upstream of boring

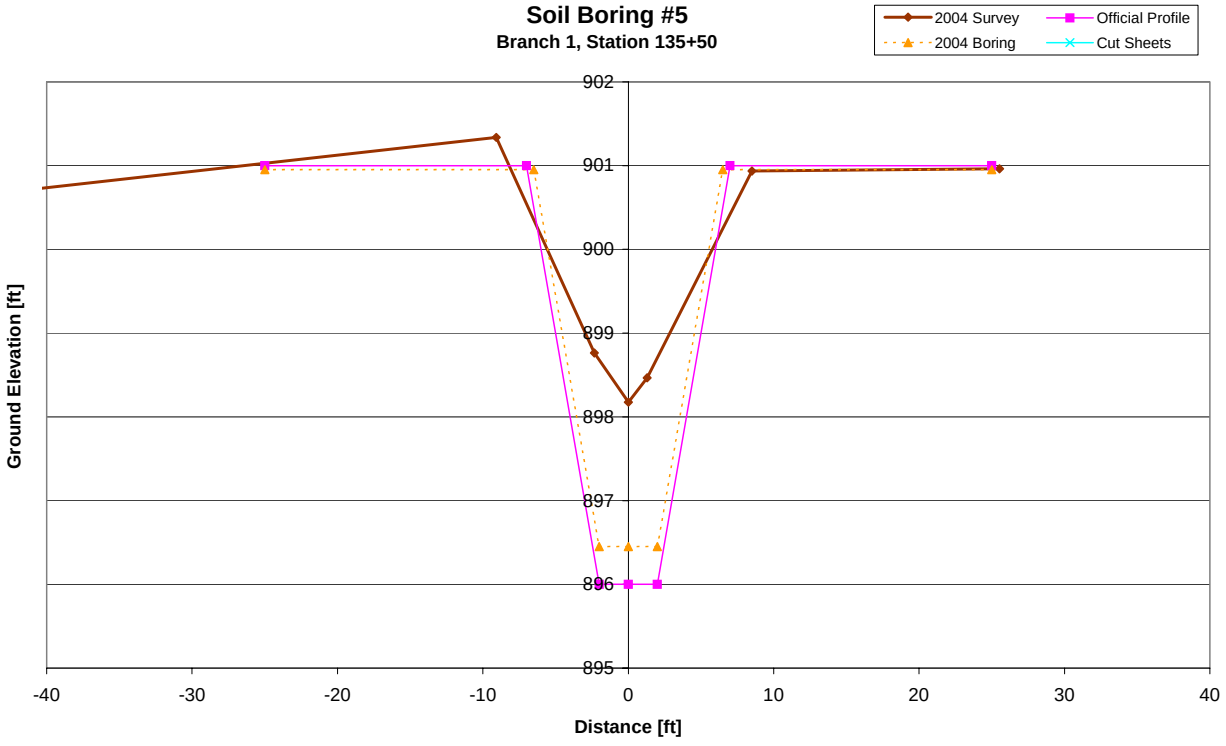


NOTE: Ground profile taken 170' upstream of boring

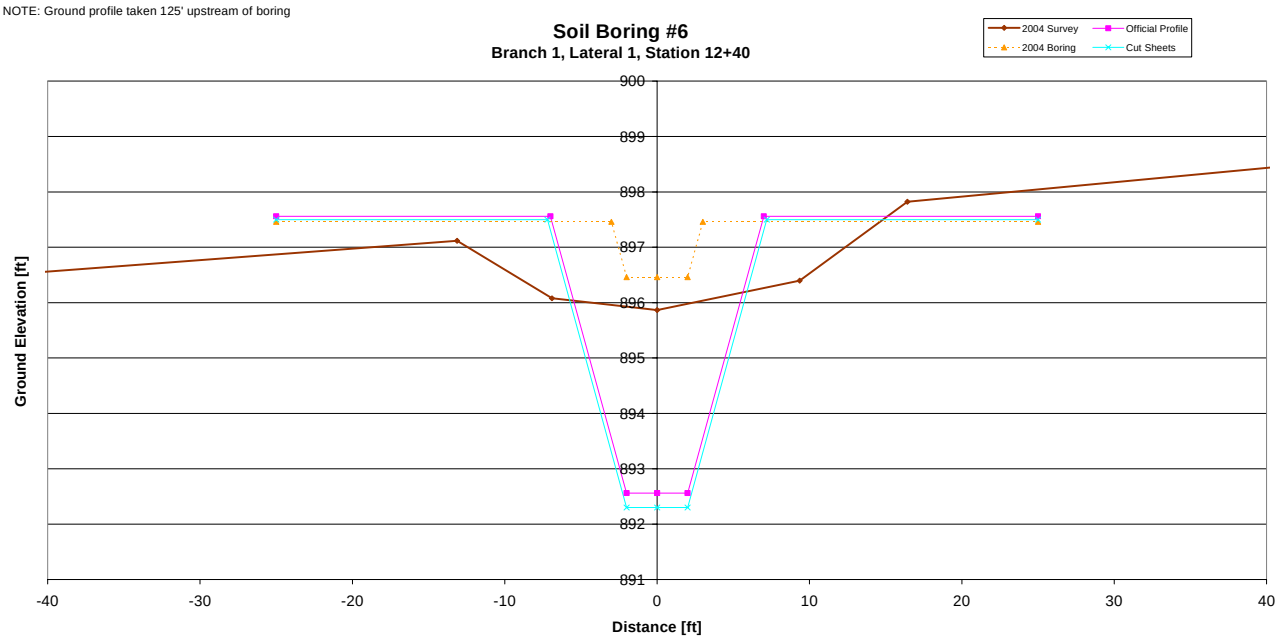




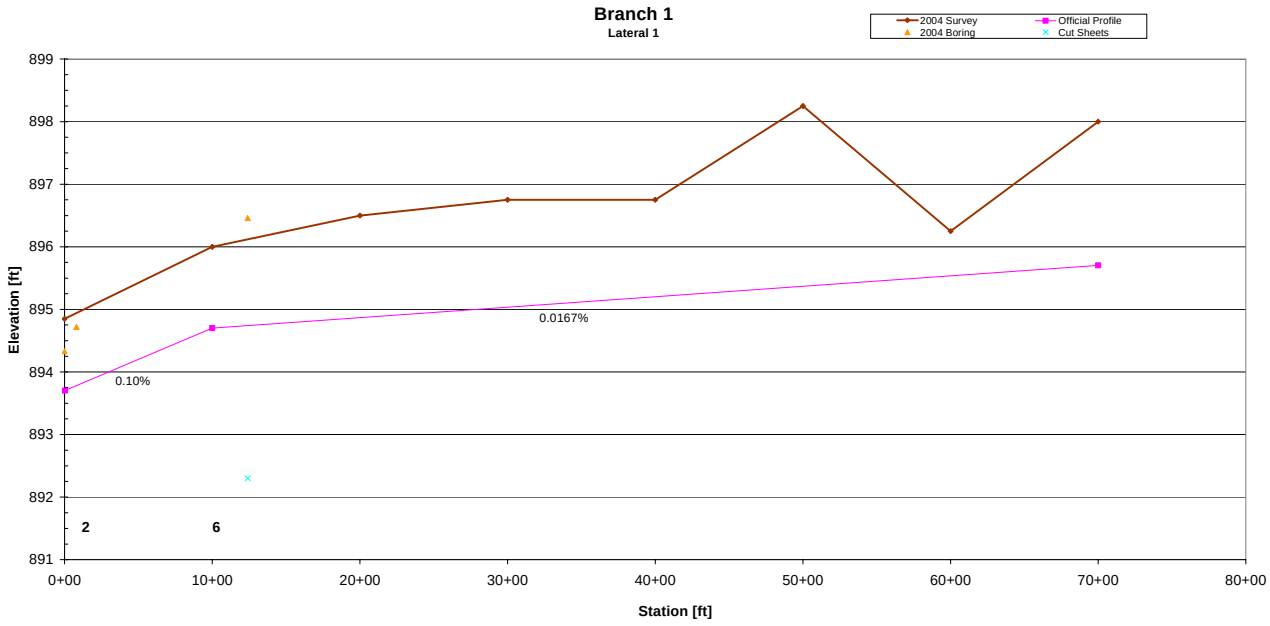
NOTE: Ground profile taken 400' upstream of boring



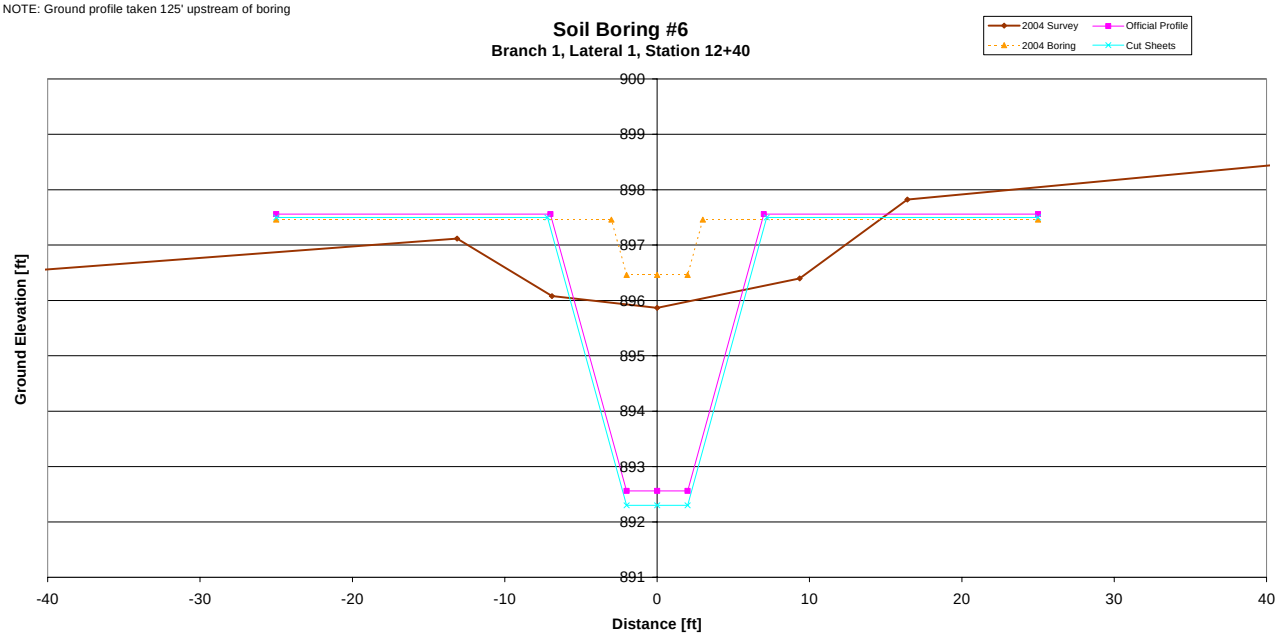
NOTE: Ground profile taken 125' upstream of boring



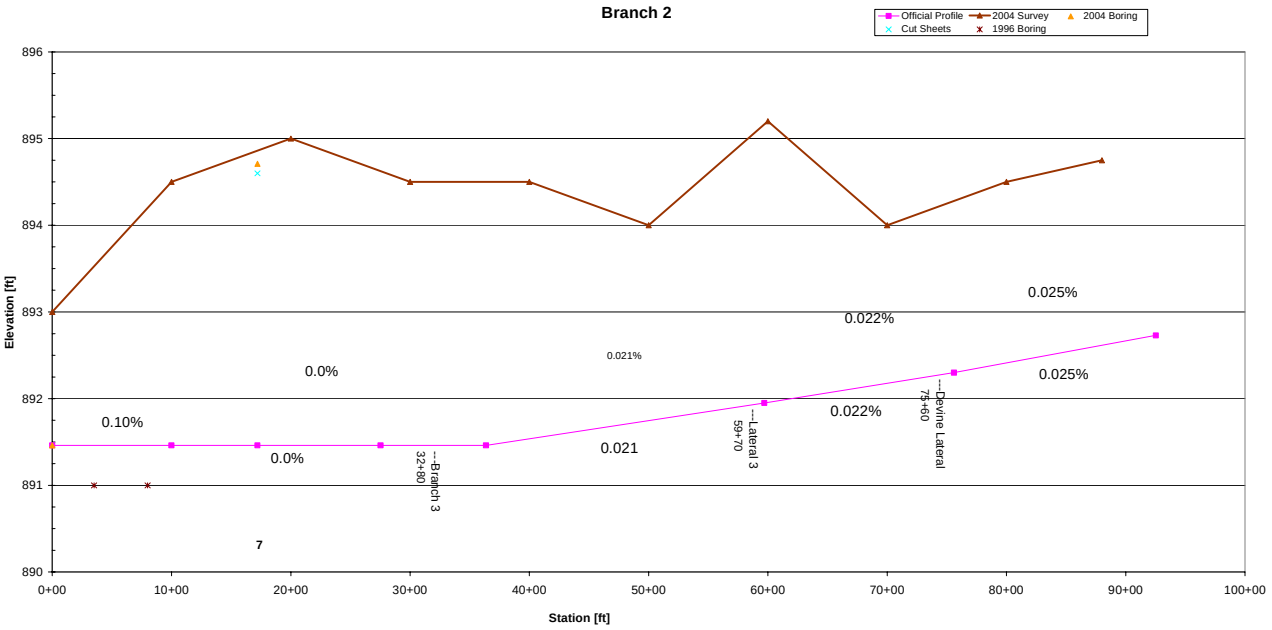
Branch 1, Lateral 1

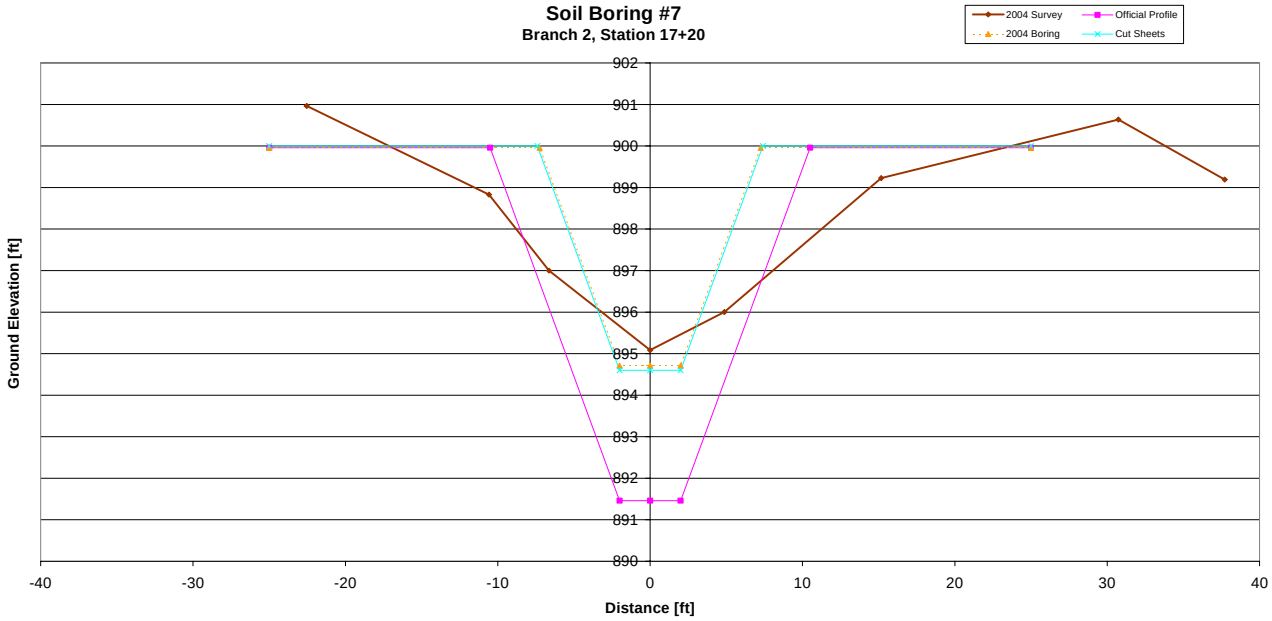


NOTE: Ground profile taken 125' upstream of boring



Branch 2

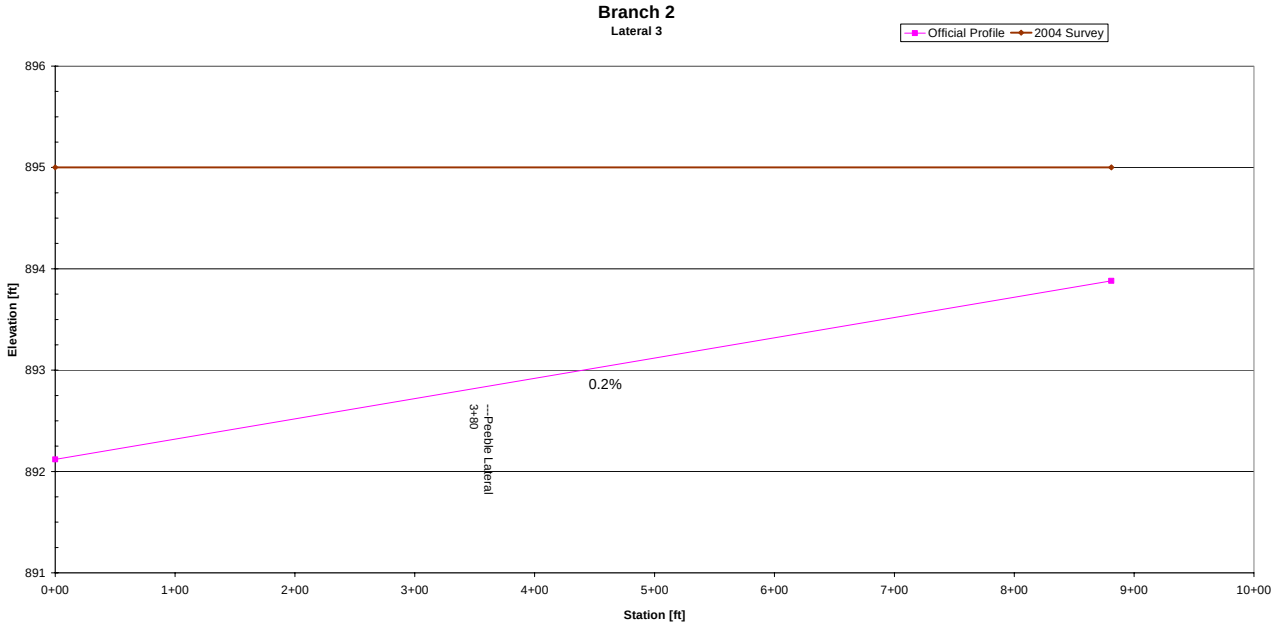




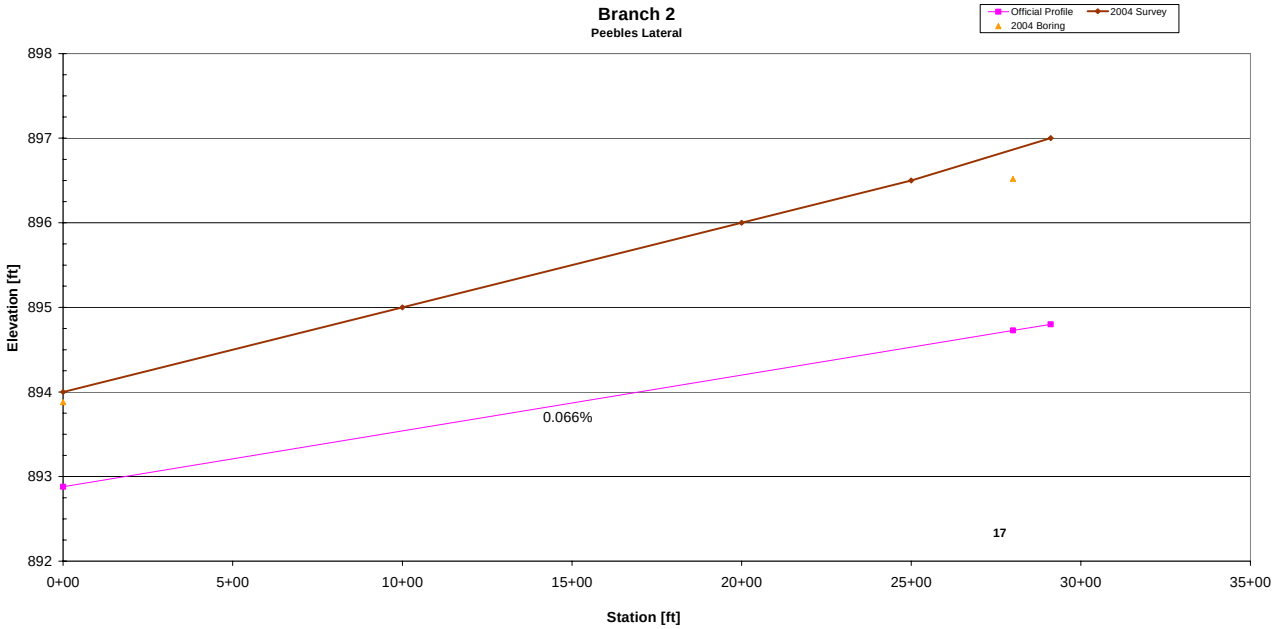
Branch 2, Lateral 1
Abandoned.

Branch 2, Lateral 2
Abandoned.

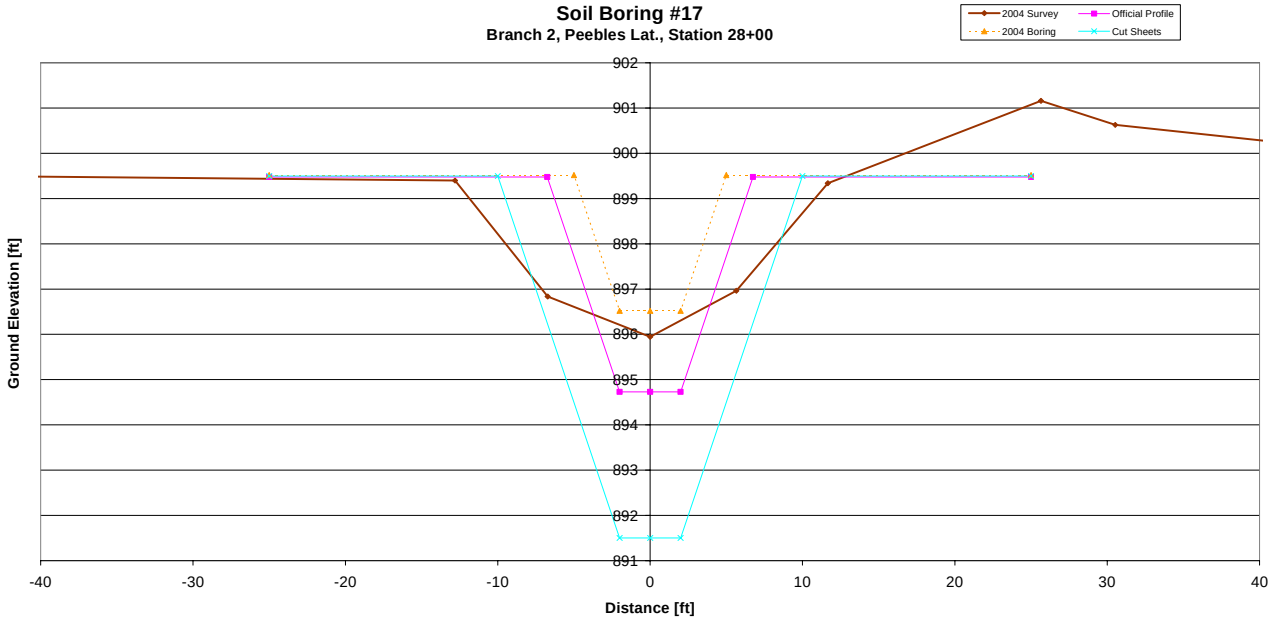
Branch 2, Lateral 3



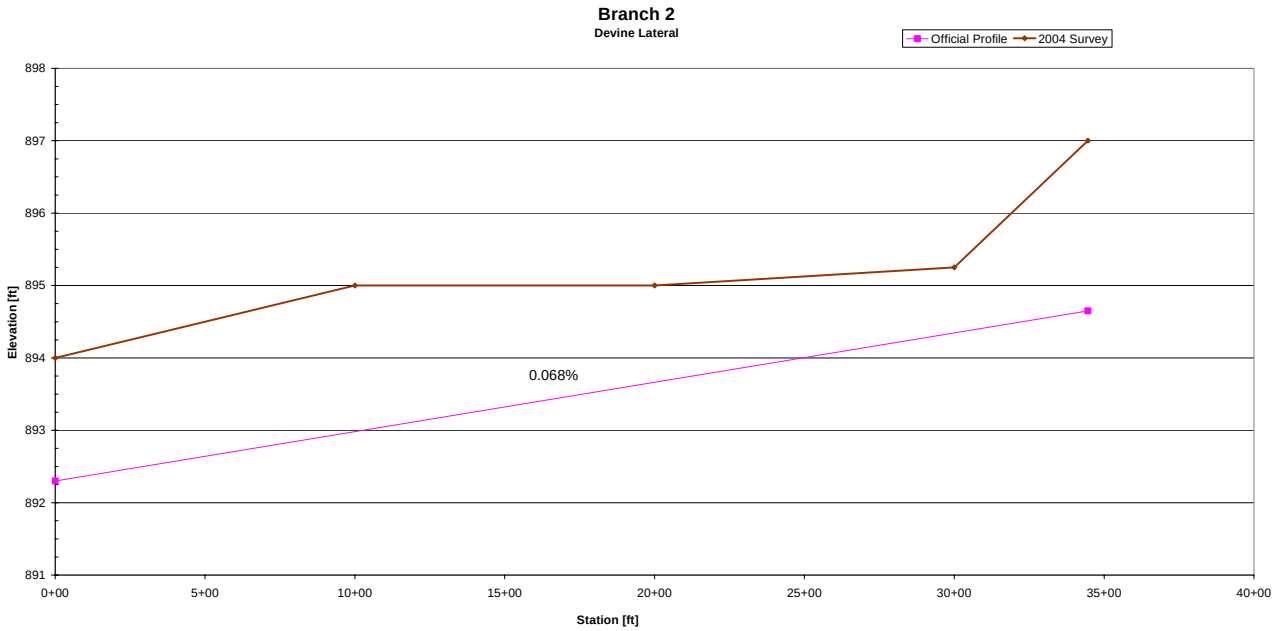
Branch 2, Peebles Lateral



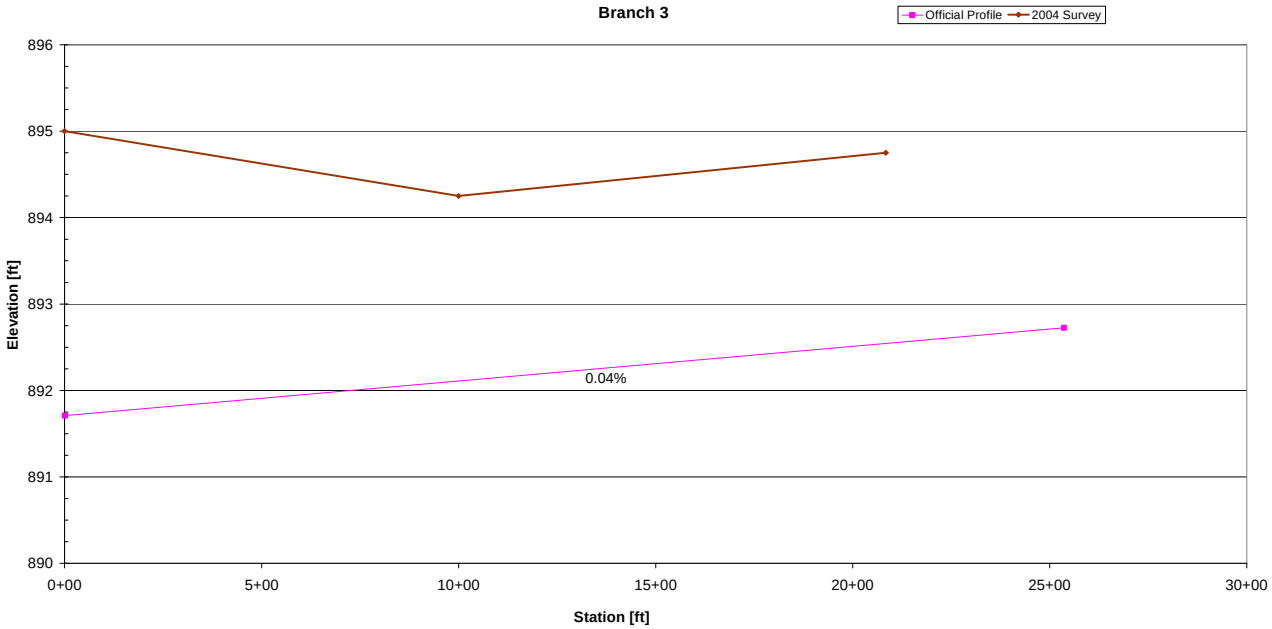
NOTE: Ground profile taken 400' downstream of boring



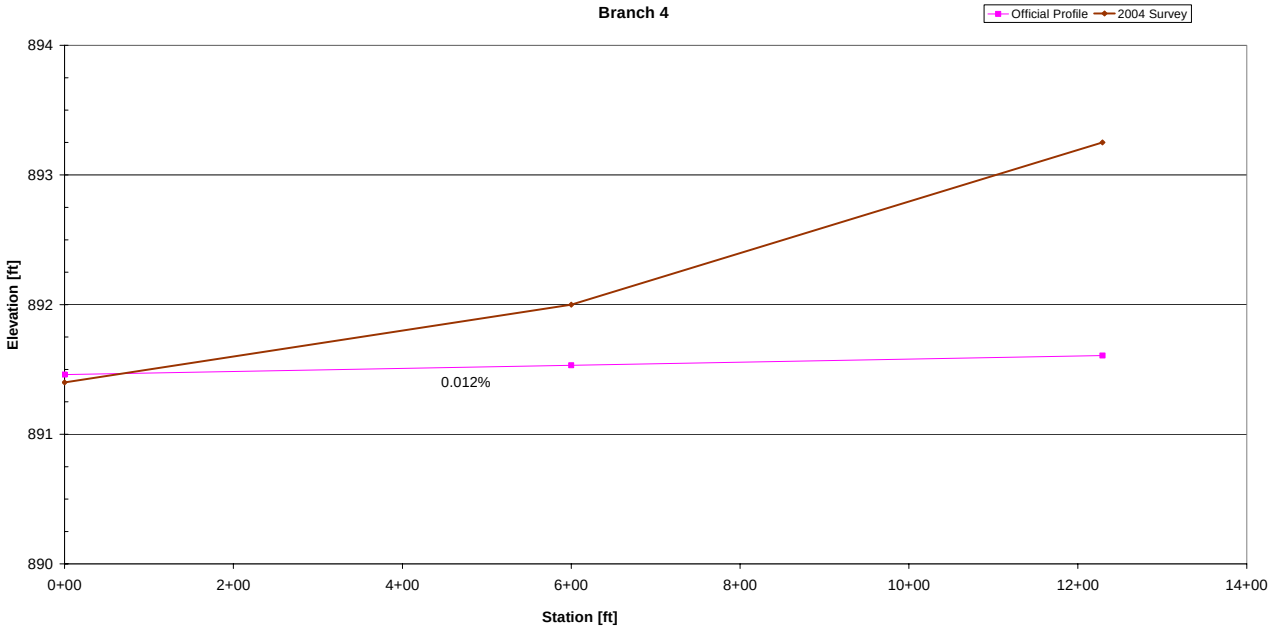
Branch 2, Devine Lateral



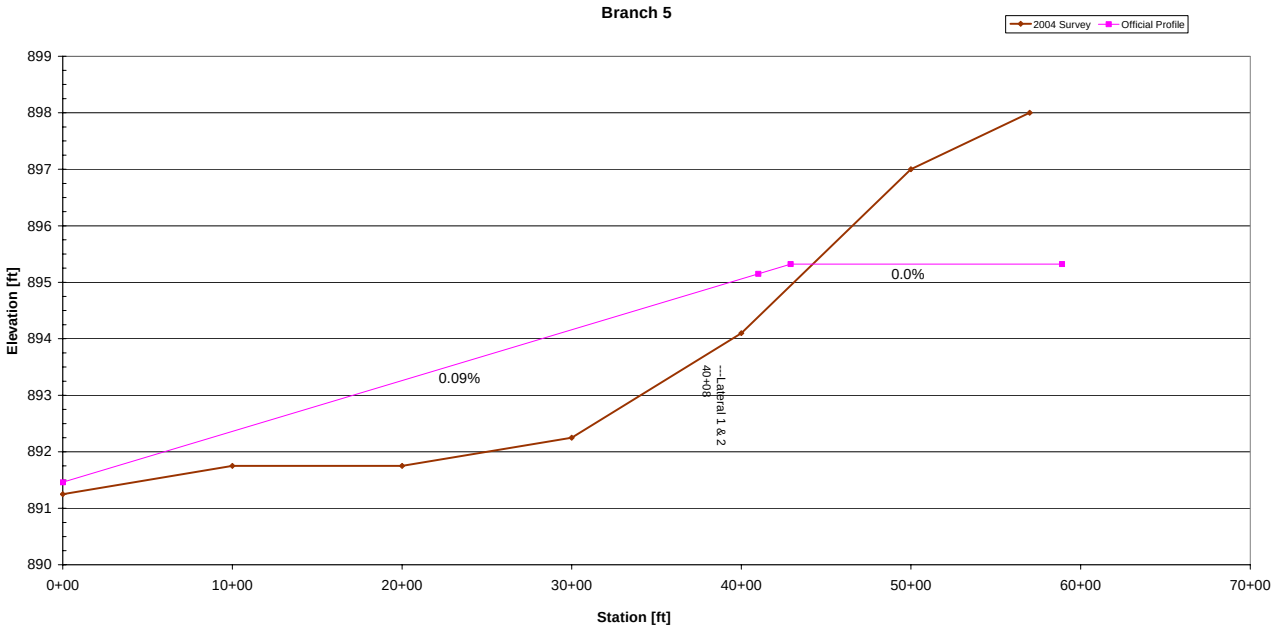
Branch 3



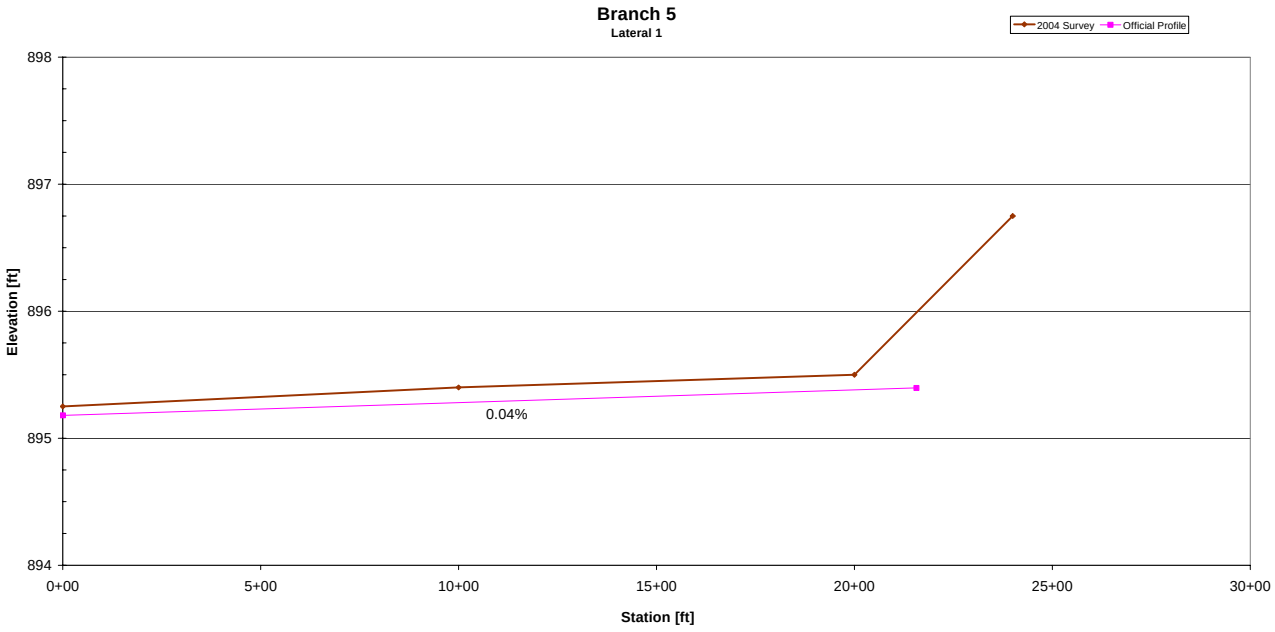
Branch 4



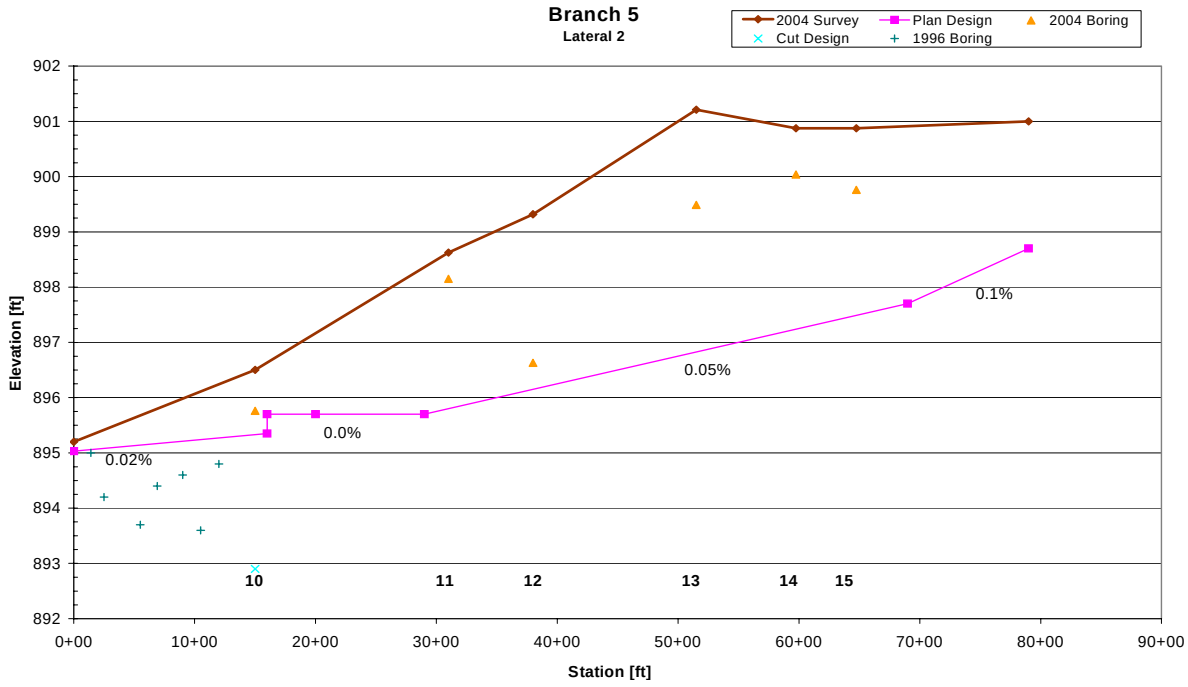
Branch 5



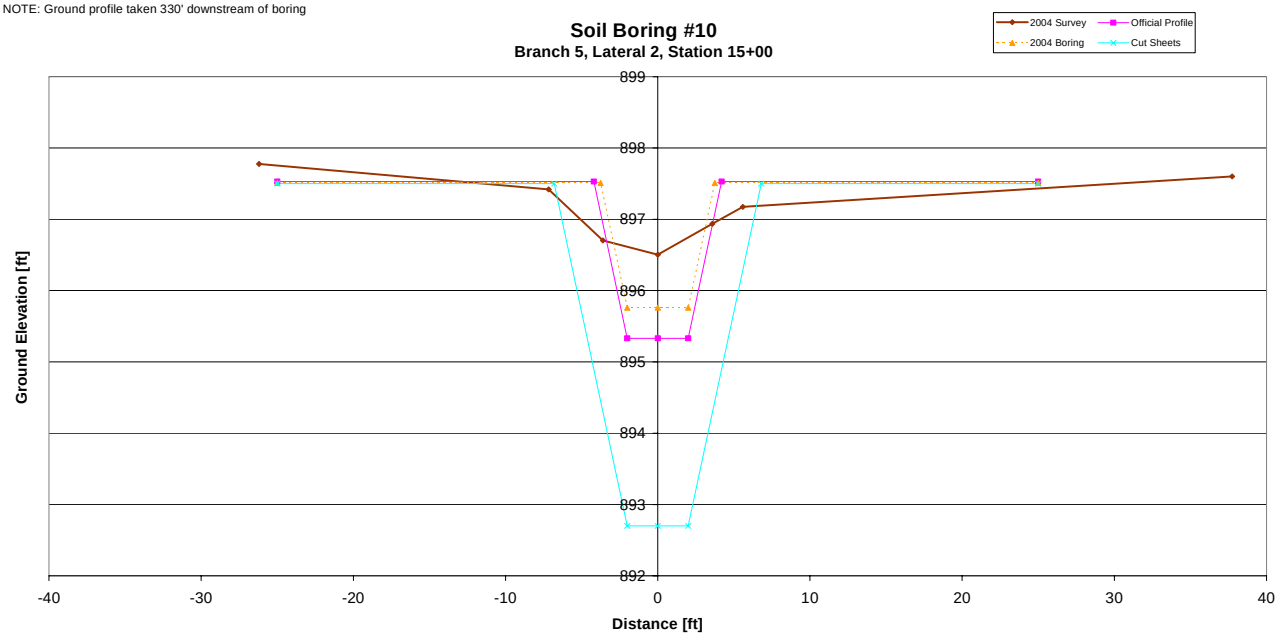
Branch 5, Lateral 1



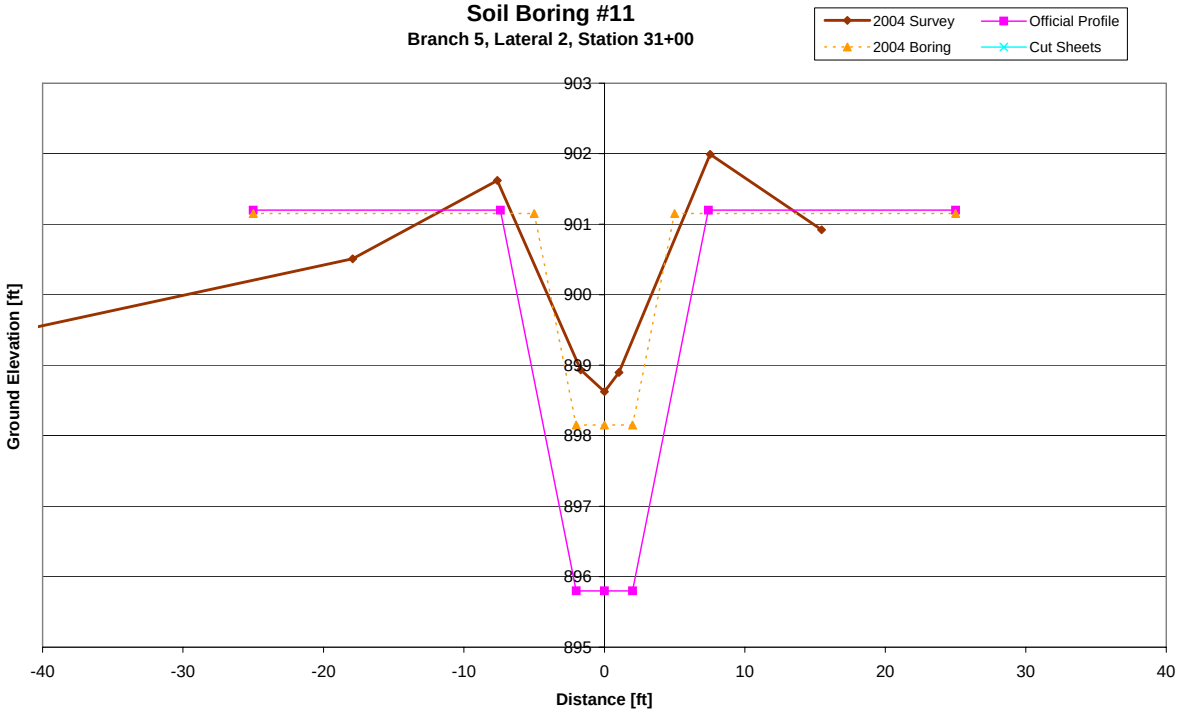
Branch 5, Lateral 2



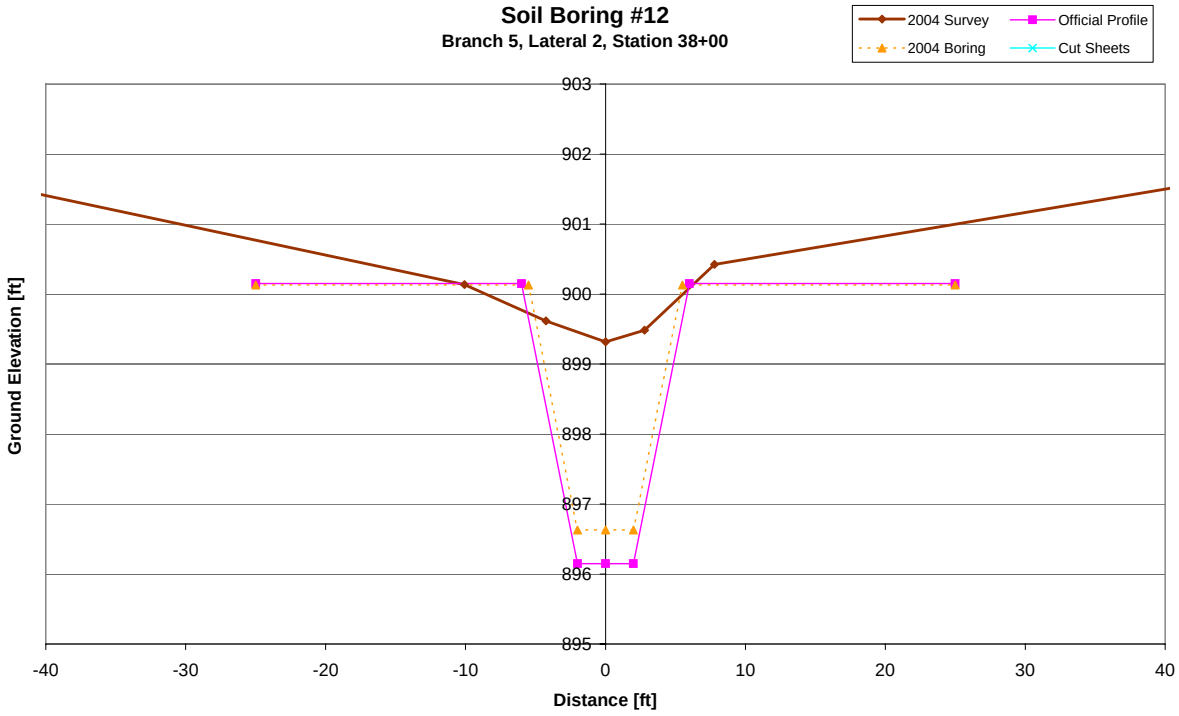
NOTE: Ground profile taken 330' downstream of boring



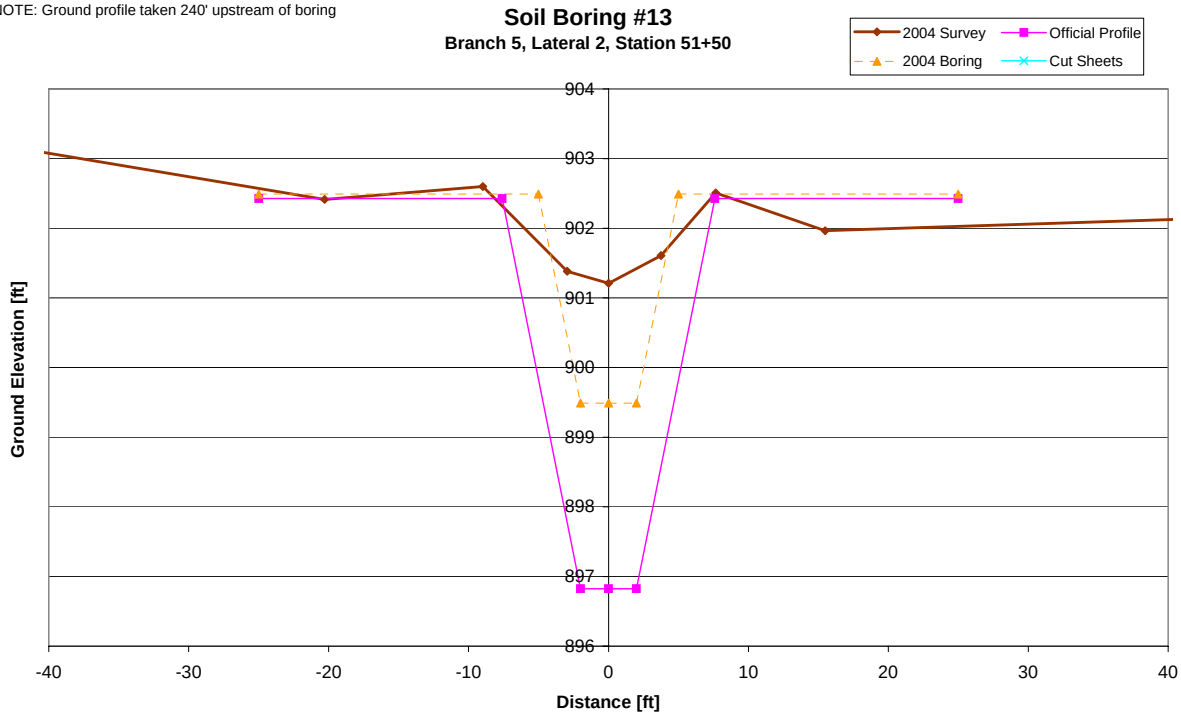
NOTE: Ground profile taken 20' downstream of boring



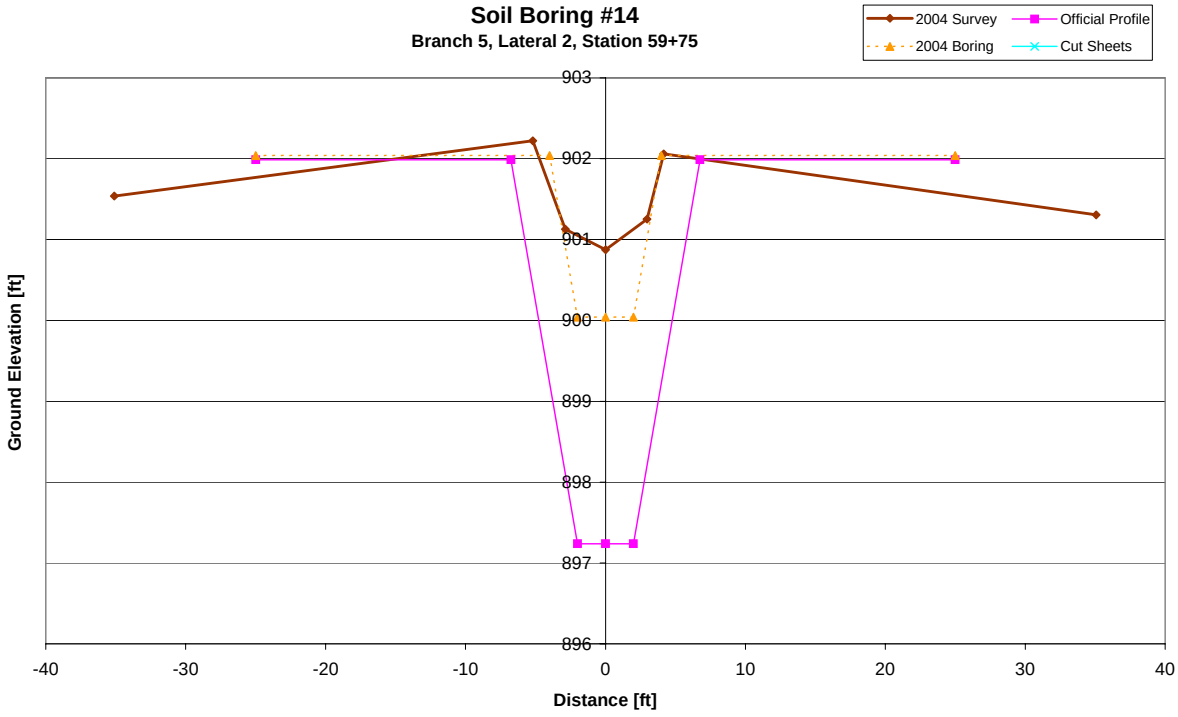
NOTE: Ground profile taken 40' downstream of boring



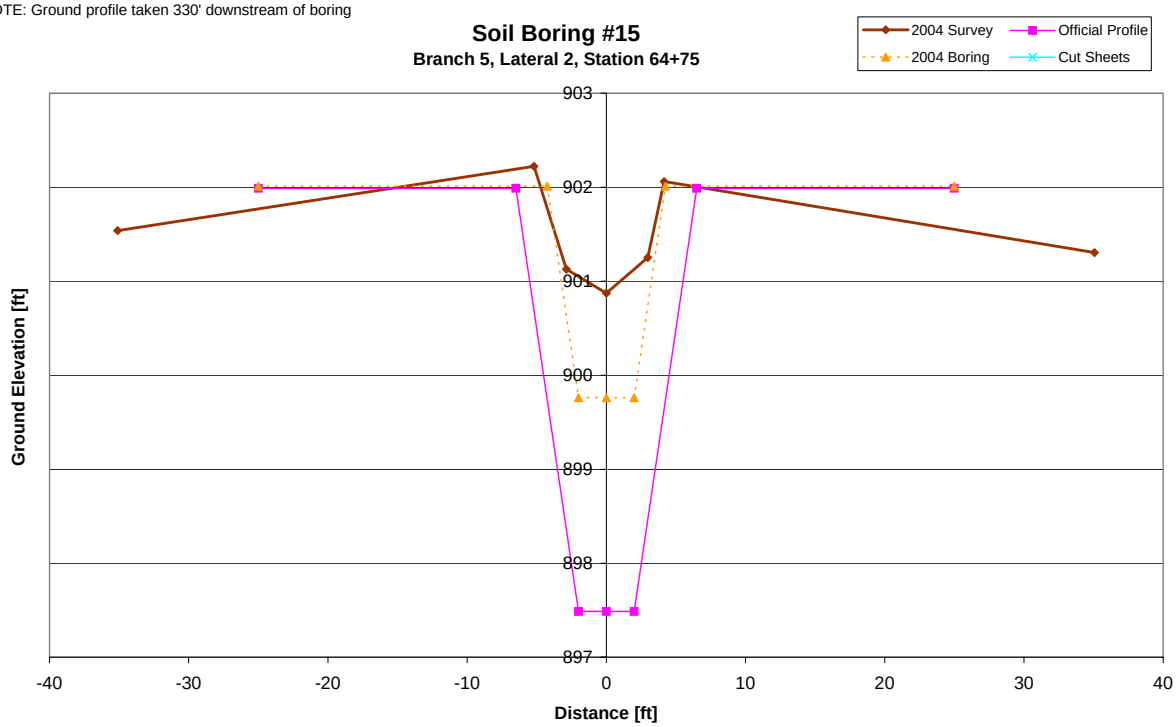
NOTE: Ground profile taken 240' upstream of boring



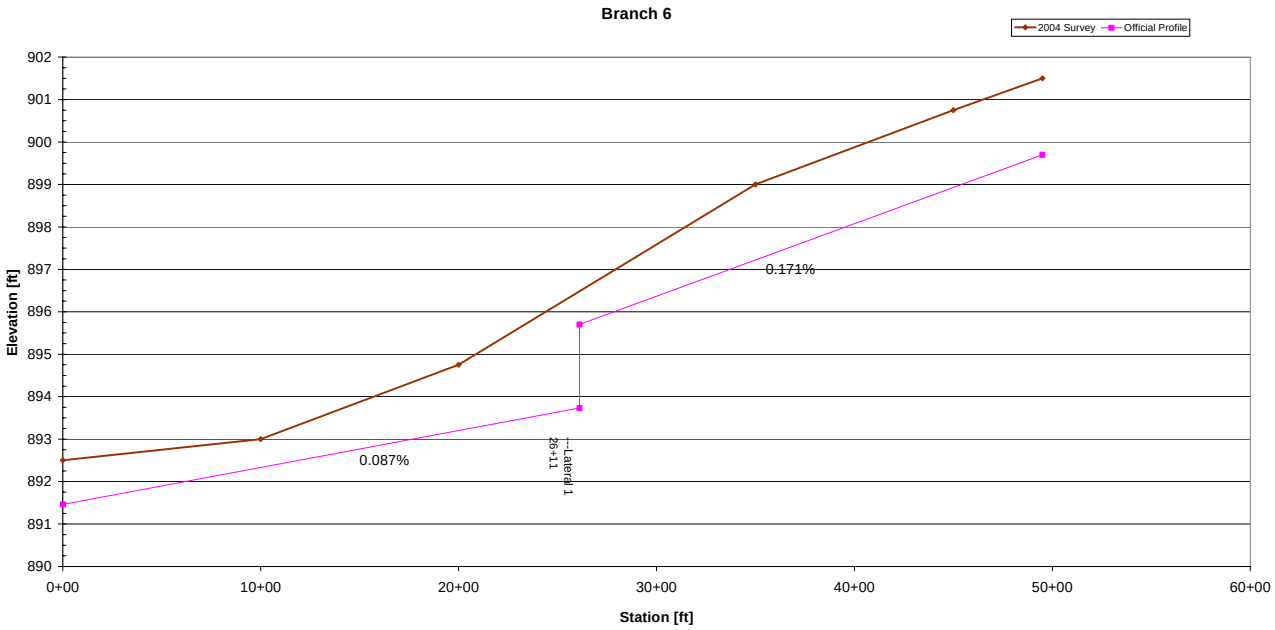
NOTE: Ground profile taken 170' upstream of boring



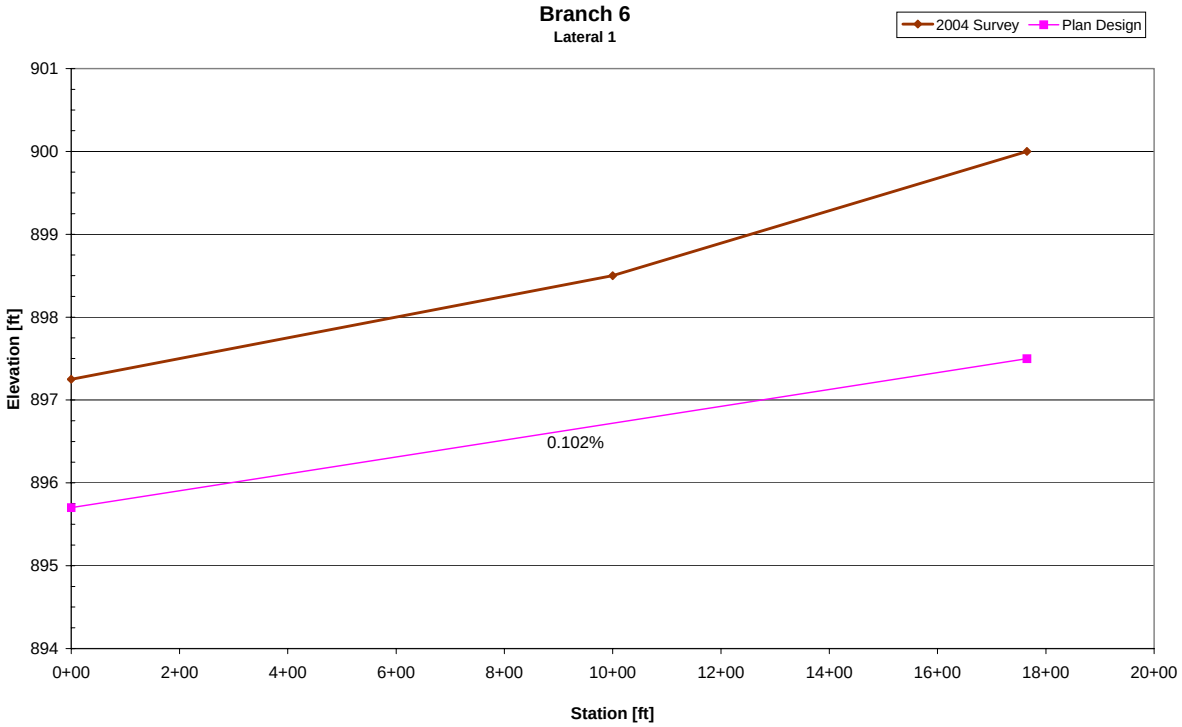
NOTE: Ground profile taken 330' downstream of boring



Branch 6



Branch 6, Lateral 1



APPENDIX F: WETLAND PRESERVATION ZONE MANAGEMENT

The permits authorized according to federal and state laws will provide the conditions for WPZ management. The following guidance will be used in preparing these permits. Monitoring and enforcement of conditions will be according to existing federal and state rules.

WETLAND PRESERVATION ZONE MANAGEMENT

Open Space Preservation

The RCWD will work with landowners to manage the uplands within the WPZs in a manner that has a positive impact on the goals of the RMP. The RCWD will obtain conservation easements, as a condition of getting a permit to alter the property, over the WPZs and any additional land that might be suitable for open space preservation from willing landowners as a part of the implementation of its rule.

Ecological Enhancement Strategies

As part of the effort to improve wetland functions and values in the wetland preservation zones, applicants will be required to utilize three ecological enhancement strategies; preservation, restoration and management. For areas with existing natural resource significance, a preservation strategy will be used. The areas will be protected within the wetland preservation easement or property. Areas that have the potential for restoration will include areas drained by ditching and/or significantly degraded by invasive plant species. Additionally, restoration sites will include scattered small areas in the WPZ where soils as well as vegetation or hydrology have been highly altered from past commercial and agricultural use. The restoration goals will be established based upon reference communities nearby. For these areas, various strategies approved as part of permitting conditions will be applied to meet restoration goals. All WPZs will be managed to maintain targeted functions and values and meet restoration goals. Management techniques will include invasive species management, designing passive recreation in lowest functioning areas, native species introductions, creating habitat structures, and scientific monitoring for iterative management planning.

Integrated resource management requires that the timing of activities to meet different goals be integrated and modified to avoid conflicts. The WPZs have, as multiple goals, wetland preservation, habitat for upland grassland and shorebirds, natural community restoration, and regional water resource management. Activities to be timed include: culvert reconstruction, ditch lowering, and installation of weirs, gates, and other control structures for managing hydrologic regimes for habitat and regional storm water management; and vegetation restoration in areas disturbed by construction, as well as some areas heavily populated by invasive plant species that will require vehicle access for soil discing and mechanical seeding.

For nesting animal species the time period from late March to August is sensitive and will be the primary determinant in staging construction and natural resource management activities.

Vegetation Establishment

Goals for plant community restoration and management will be based upon approved reference sites. Establishing plant communities within the wetland preservation areas is critical to the success of this RMP. In areas where existing vegetation will not be subject to excavating activities, seasonally targeted herbicide spot treatment, burning, heading of weeds prior to seed set, shading, and spot root pulling will be employed. In excavated wetland areas establishing a diverse composition of native species will be required. Reed canary grass is prevalent in the existing hydric soil. Seasonally targeted flooding, spot herbicide treatment, and burning will be employed for two to three years to weaken and reduce the cover of this species. Seeding and spot planting techniques will be used to begin species introductions. Various techniques such as hand broadcasting, mechanical drilling, and frost seeding are recommended. In addition, aquatic transport techniques will be employed for some sedge seed introduction. This will be conducted on a long-term basis, relying on the monitoring of surface water flow patterns to develop during restoration. Plantings of wetland forbs, grasses, shrubs and trees should occur in the late spring or early fall of the year. Protective measures will be used to minimize herbivory on established and establishing vegetation and stands of uncommon or rare vegetation. Deer, muskrat, beaver, and goose populations will cycle. Management will include monitoring their activities and implementing protective measures at the appropriate times. Primarily fencing and netting will be installed to protect shrubs and trees from browsing to prevent significant losses where appropriate. Trap and relocate and hunting measures should be considered as a last resort.

Adaptive Management Strategy

In order to preserve the ecological integrity of the site, active maintenance and management will be required. Adaptive management relies on the regular monitoring of several ecological indicators to decide on the types, timing, and location of natural resource management**.** Monitoring of ditch systems will be performed to ensure that they work properly; monitoring of water levels for seasonal precipitation and runoff; monitoring of wetlands will occur to meet the requirements of wetland replacement plan permits; and monitoring of potential hazard areas with roads, bird nesting, and natural community restoration will occur. Monitoring data will then be used to develop annual management activities and integrated to ensure that management decisions for the various activities are not conflicting. In addition, recreational monitoring will occur to manage human use of the area consistent with the other goals of the RMP.

The adaptive management strategy will require a working partnership between all resource management and engineering personnel from RCWD and local communities with an interest in the RMP.

Vegetation Restoration Techniques

Ecological restoration projects utilize many tools for maintaining and managing natural areas. One of the most common management tools is prescribed burning. Burning creates a heat sink, recycles minerals to the soil, and allows full sunlight exposure. These three microenvironment characteristics alter the competitive advantage of plants and habitat features for animals. Native prairie communities evolved with fire, and depending on the timing of the fire native prairie species can be selectively favored. Burning also alters plant

physiological activities. Perennial species translocate sugars between the above ground biomass (AGB) and below ground biomass (BGB) based upon several triggers. Environmental triggers include mowing, herbicide application, fire, and drought. Seasonal production of sugars (photosynthesis) and storage in the root system is a primary factor in timing introduction of the stressors. This requires an understanding of the seasonal AGB growth rate and BGB storage.

Prescribed burning, selective herbicide applications, flower bud heading, mowing, discing, freezing, and flooding will all be relied upon to restore and manage vegetation to meet goals of the RMP. The timing of these treatments will be determined based upon the species being managed. In general, fall prescribed burning will favor seed germination and bud growth of species which have a higher growth rate in a warm, high light environment. Grass species collectively called cool season grasses exhibit shoot growth under cooler temperatures of early spring as opposed the warm season grass species. This can be exploited to time burning and other management activities. Cool season grasses are expected to have a competitive advantage after a fall burn. Reed canary grass is a cool season grass. This information, along with knowledge of the seasonal growth and storage rates will be used to manage this dominant, invasive species found in the wetlands throughout the WPZs. Qualified crews may only undertake this management practice.

Herbicides used for management will be limited to glyphosate-based formulations (i.e. Round-up and Rodeo) which are known to have a short life span in the soil. Formulations for which evidence exists for reducing soil microorganisms will not be applied. Herbicide use will be limited to targeted backpack spray applications. An exception may be when discing a large area for reseeding, then tractor hose spray application with no wind conditions may be used. Only qualified applicators may undertake this management practice.

Bud heading is a very effective way to reduce and eliminate common weed forbs (non-grass, non-woody species) which are annual, biennial, and short-lived perennials. Canada thistle and knapweed are examples of species which can be invasive in native grassland communities and respond well to bud heading. The growth habit of these species is heavily reliant on seed production for species longevity as opposed to long-lived root systems (like rhizomatous grass species). This understanding is exploited by persistently clipping the flower shoots at the stage of flower bud set (an easily observed feature learned with little training). Over the life cycle of the plant (annual, biennial, or 3-5 years) the seed bank is depleted as it germinates each year and the heading depletes ‘deposits’ to the seed bank. It is critical not to cut at the flower stage, as cut flowers are programmed to go to seed. This technique can be undertaken by citizen volunteers without undo risk. Volunteer headers must check regularly the plots they are assigned to in order to head at the proper time. This can vary from year to year based on weather conditions.

Flooding can significantly reduce reed canary grass stands. The meandered channel combined with control structures will allow for alteration and manipulation of surface water and thus the use of flooding for reed canary grass management**.**

The meandered channel design will also allow for planned introductions of aquatic species seed. Sedges are amenable to this technique.

Invasive plant species management will use management units. Site mapping of native and invasive species stands will be used to establish management units and restoration goals. All vegetation management techniques will then be considered and a plan for each unit will be established. Adaptive management and monitoring will be required for success. Citizen monitoring will be effective in developing the data for management decision-making.

Wildlife Crossings

Wildlife crossing roadways are hazardous for both motorists and animals. The WPZs provides habitat for many mammals, reptiles, and amphibians, which will travel between sites and invariably cross roadways. Safe wildlife crossing measures will be incorporated to the greatest extent possible into potential roadway hazard areas to minimize mortality of herpetiles and small mammals and deer-vehicle collisions. Wildlife crossing strategies developed by many state departments of transportation will evaluated for use in the potential hazard areas.

Funding appropriations will be required for monitoring wildlife crossings and incorporating features into the design of roadways. Specific design elements and locations will require approval of the RCWD to ensure that the techniques and locations are consistent with data being developed on detail the timing, location, and species of wildlife crossings. Wildlife crossing features include oversized culverts at designated locations and low walls or fences, with the overall objective of directing wildlife to the culvert crossings. The most likely method to provide safe passage for wildlife at the location of large barriers would be an underpass or a green bridge. A green bridge could be designed to accommodate both recreational trail users and wildlife. Green bridges and underpasses suitable to wildlife migration can be more costly to construct than a typical road crossing. In addition to these structural features, lower speed limits, stop signs, and other features to heighten motorist awareness and caution may help reduce vehicle-damaging wildlife collisions, especially at night when many animals are more active. Fencing or walls that inhibit deer passage will be built along the reach of the roadway that intersects the WPZ to direct deer to the appropriate crossing.

Carp and Canada Goose Management

Canada Goose populations have increased significantly in the Twin Cities area. Research suggests that the vegetative covers associated with suburban and urban areas, linked with low predator levels, have led to the big population rise. The Canada Goose prefers short grass areas adjacent to open water for rearing young and foraging. Parks with ponds and lakes, recreational trails, and gently sloping lawns create ideal grazing areas. The droppings are a nuisance to humans using the areas and also can impact water quality of the adjacent water bodies from increased bacterial activity and nutrient loads. The wetland preservation areas will not have park-like vegetation and are not expected to need Canada Goose management. However, in upland areas of the WPZs where native vegetation establishment is taking place, Canada Goose grazing will be considered. Landscape design features should consider the nuisance associated with open water features and mowed lawns. These landscape features should not be used. Instead, open water should have naturalized plantings that include trees, shrubs, and tall grass buffers.

Carp and other rough fish reported in wetlands of the WPZs will be managed. Since the WPZs will incorporate habitat features for shorebirds, these fish species may compete with the birds for invertebrate food sources. Carp feed on aquatic and emergent vegetation and stir up bottom sediment that will cloud water and interfere with shorebirds feeding in aquatic areas. Fish migration to the wetland areas will occur during high flow conditions. Large species of fish will not be able to overwinter within the meandered channels. Monitoring of fish species use of wetlands will be used to develop rough fish management strategies, including installing fish barriers.

Public Use and Educational Opportunities

Depending on ownership and use of each property, passive recreational opportunities may exist within the WPZs. These activities include walking, bird watching, environmental education, and photography. Trails could be constructed of impervious materials and elevated walkways in wet areas. This design will maximize the passive uses of the area and avoid the most ecologically sensitive portions. The restored wetlands and native vegetation will create habitat for many species of wildlife and areas managed specifically for shorebirds will greatly enhance public value. Interpretive signs describing plant communities, wildlife, and wetland ecology could be located in strategic locations throughout the WPZs.

Human Impacts

Trail development will have as the primary goal sensitivity to significant natural features such as nesting areas and uncommon stands of vegetation. Trail maintenance will focus on avoiding and minimizing soil compaction and trail widening due to users walking around wet areas. Authorized personnel will regularly patrol the trails to document encroachment into adjacent natural areas, vandalism to interpretive signs, benches, overlooks, trash dumping. Impacts such as collecting vegetation or wildlife harassment will be prohibited. Use of the areas will be limited to the designated trails with no off-trail hiking or biking allowed. There will be a few designated access points to the trail system with offsite parking.

Management Authority

Management and maintenance of the WPZs will be conducted according to the special conditions for all permits granted by the RCWD and other permitting authorities. The RMP Rule gives requirements for permits in addition to any other state or federal conditions.

APPENDIX G: FREQUENTLY ASKED QUESTIONS

What is the purpose of the Resource Management Plan?

To better protect and preserve environmental resources in the context of increasing development pressures and as land values increase, create a mechanism that augments the ecological benefits provided by regional planning.

Why is the RCWD developing the RMP?

- The RCWD plays a treble role in that they are the LGU for the WCA, the Ditch Authority responsible for maintaining the drainage of public ditch systems, and Watershed District responsible to protect water resources. These roles must be considered if the RCWD undertakes any activity within a ditch system.
- Through the analysis of a traditional ditch repair scenario, the District has shown that such a repair would provide minimal benefit for the changing land use that is no longer dominated by agriculture at the expense of environmental degradation and decreased water quality for a more urbanizing population. This RMP is the preferred alternative to address environmental resource issues for the changing demographics of the area and the associated changes in land use.

How does this RMP fit into WCA rules and Section 404?

- The RMP is being developed within the context of the Comprehensive Wetland Protection and Management Plan process specified in WCA rules. It would be adopted through the RCWD rule making process.
- The RMP is being submitted to a federal review process under Section 404 of the Clean Water Act so that CWA Section 404 principles can be incorporated into the RMP and the RMP can be incorporated by reference into subsequent individual CWA Section 404 permit evaluations.

What are the assumptions of the RMP?

- The RMP has two primary assumptions: 1) Development pressure will increase and development will occur in the area; 2) Through the RMP, the RCWD and its partner regulatory agencies, will be able to ensure more sustainable and holistic resource management for the area through the implementation of the RMP.

Is this a development plan and does it give pre-approval for wetland impacts?

- NO. The RMP provides a framework for the prioritization of resource protection areas in a development scenario and will be implemented through the adoption of a Rule. Future applicants will be required to adhere to the same basic rules and criteria for impacting wetlands. However, the RMP identifies higher quality areas on a landscape level scale and provides incentives for protecting these resources.

How will the RMP's goals be accomplished?

- The RMP creates a conceptual framework that identifies high priority resource areas warranting protection, restoration, and enhancement.
- Rules will be implemented that encourage landowners to protect and enhance the higher quality resources and incorporate low impact development strategies (rain gardens, green roofs, etc.) as they develop their land.

How is this RMP different from the regular WCA and Section 404 processes?

- The RMP identifies and ranks wetlands and other ecological resources at a landscape scale that allows permit applications to be evaluated in a larger ecological context within the drainage area. This will provide additional information to regulatory agencies at all levels and facilitate sequencing analysis of proposed impacts and identify preferred options for mitigation location.
- The RMP will allow applicants to obtain mitigation credit for different types of actions (conservation easements around high quality existing wetlands, different types of wetland restoration/enhancements, innovative stormwater management features, etc.) than are typically credited under the WCA and Section 404 permits.
- The RMP will utilize onsite functional analysis of existing wetlands to direct the design and location of replacement wetlands. This will be done in such a way as to mitigate the specific functions and values lost due to proposed impacts, not just the acreage as a requirement of WCA and Section 404.
- The RMP will allow for a large scale redesign of existing drainage systems that is more ecologically sound, and that meets water and wetland quality goals in an increasingly urbanized landscape.

What aspects of the RMP are the same or similar to existing WCA and Section 404 regulations?

- Wetland delineations, impact analysis, and replacement plan applications will be required for every application involving wetlands.
- Applicants will still be required to go through the same sequencing process (avoidance, minimization, replacement) and project justification as they do under current rules. However, the detailed information on wetlands and other resources available to reviewing agencies through the RMP will streamline and expedite this process and provide additional flexibility in some cases.
- The replacement ratio is intended to remain the same (2:1) with half of the replacement being in the form of new wetland credit. For Anoka County, this replacement ratio is greater than the 1:1 ratio under 8420.0650.
- All current rules and regulations not specifically modified in the RMP and adopted by rule will remain the same.

What role does the TEP and Corps play in the RMP development?

- The TEP and Corps provides guidance and oversight to the technical aspects of the methods used in the development of the RMP. Specifically, the TEP and Corps has evaluated and approved the following:
    - The MnRAM questions that were be used in the evaluation of wetland functions at a landscape scale.
    - The criteria that was used to select a defined area for wetland functional analysis.
    - The methodology and criteria that was be used to identify high priority wetland areas (i.e. wetland preservation zones).
    - The specific rules that will apply to wetland preservation zones to encourage applicants to avoid impacting these areas.
- The TEP and Corps must evaluate and define the various mitigation alternatives available to applicants in the RMP area. Specifically, the TEP and Corps will evaluate the following:
    - The definitions of enhancement, restoration, preservation, and other terms.
    - The amount of mitigation credit that will be allowed for the different types of mitigation.
    - The appropriate success standards for activities such as restoration, preservation, etc.

If the TEP and Corps approves the various technical steps associated with the RMP development, is this a default approval of the RMP?

- NO. The TEP, regulatory agencies, the general public, and other interested parties will evaluate the overall plan. Approval of the various technical aspects of the RMP (MnRAM methodology, mitigation ratios, etc.) gives legitimacy to some technical aspects, but does not constitute a complete approval of the RMP in its entirety.
- The Corps also will not approve the RMP, but will instead apply a CWA Section 404 framework and specifically identify the RMP's compatibility with CWA Section 404 guidelines.

APPENDIX H: RMP DEFINITIONS

Definitions are generally consistent with terms in Minnesota Rules 8420.0110 (identified here as WCA), USACE guidance documents, or Section 404, proposed or existing. Reference for the definition is provided in parentheses. All terms for mitigation activities in Table 14 are defined here.

Applicant – a person, corporation, government agency, or organization that applies for an exemption, no-loss, wetland boundary, wetland type, replacement plan or banking plan determination or equivalent, or someone who makes an application to withdraw wetland banking credits from the wetland bank (WCA).

Buffer – an upland and/or riparian area that protects and/or enhances aquatic resource functions associated with wetlands, rivers, streams, lakes, marine, and estuarine systems from disturbances associated with adjacent land uses (proposed Section 404).

Compensatory mitigation alternatives -- the alternative of banking may be considered when site conditions do not allow for credit according to the RMP for 1:1 and functional replacement; the bank site is required to meet the landscape function requirements under the RMP and in-kind replacement when the resource is regionally important.

Contributing Drainage Area – the land surface area that drains to a wetland under unaltered conditions and provided the surface water hydrology to support a wetland.

Creation – gain in wetland area by converting nonwetland to wetland.

Critical Upland Habitat – upland areas immediately adjacent to wetlands that are necessary for the wetland's existence and functional capacity.

Degraded Wetland – provides minimal function an value due to human activities such as drainage, diversion of watershed, filling, excavating, pollutant runoff, and vegetative or adjacent upland manipulation (WCA).

Demonstrable Threat to a Wetland– Clear evidence of destructive land use changes that are consistent with local and regional land use trends that are not the consequence of actions under the permit applicant's control.

Direct Impact – to fill and eradicate an aquatic resource.

Ecological Enhancement – for degraded wetland; specific functions are increased and possibly some functions are decreased and there can be a decline in other wetland functions; no gain in area (USACE guidance).

The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to

a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area (proposed Section 404).

Establishment (see Creation) – gain in wetland area by converting nonwetland to wetland.

High Priority Areas – wetlands identified through formation of the Wetland Preservation Zone or having high landscape function.

High Quality Wetland or Upland – vegetative integrity score of high using MNRAM 3.0 functional assessment method for wetlands and Natural Heritage Program grade of B/C or higher for uplands.

Impact - a loss in the quantity, quality, or biological diversity of a wetland caused by draining, filling, excavating, or diverting water from a wetland,' per the WCA., or conversion of an existing high functioning wetland type to some other type without equal or greater function by inundation or other means.

An adverse effect (proposed Section 404).

Indirect Impact – to decrease ecological function of aquatic resource, including actions which alter hydrologic regime; to drain an aquatic resource (USACE guidance).

In-kind and Out-of-kind – mitigation for wetland impacts based upon location; in-kind is required for less abundant wetland communities in the 53-62 watershed; out-of-kind is allowed for impact wetlands communities abundant in the watershed.

In-place Mitigation – located at site of wetland fill and area of human activity converting land use from current condition; equivalent wetland services provided by a combination of infiltration BMPS accepted for credit in this Plan to replace the storage and water quality treatment functions of a wetland.

On-site Mitigation or Replacement – to maintain wetland functions within the same contributing drainage of the impact wetland, if contiguous with an existing wetland or high quality upland habitat area; on-site mitigation is important for hydrologic function replacement as close as possible to the CDA. On-site mitigation of habitat functions is allowed only if contiguous with WPZ.

An area located on the same parcel of land as the impact site, or on a parcel of land contiguous to or near the impact site (proposed Section 404).

Off-site Mitigation – to maintain wetland functions within the RMP watershed; must be contiguous with the WPZ, and is limited to habitat functions which do not meet on-site requirements for replacement.

An area that is neither located on the same parcel of land as the impact site, nor on a parcel of land contiguous to or near the parcel containing the impact site (proposed Section 404).

Partially Drained – effects of drainage ditches on the hydrology of wetland such that the wetland has a drier regime than under pre-drainage conditions; while climates change, the wetland is assumed to be partially drained if a ditch is functioning to any degree; the extent of partial drainage is determined using the Scale of Degradation.

Wetlands that have had their original, natural hydrology altered, but have not been effectively drained; quantified by comparing the pre-altered condition to the existing altered condition, using monitoring and estimations such as lateral drainage effect models (USACE definition).

Preservation Credit – the preservation must augment functions of newly established/restored/enhanced resources; preservation + establishment/restoration/enhancement activities; may operate alone IF demonstrable threat outside the control of an applicant and regionally important functions.

Preservation/Protection/Maintenance – remove a threat; prevent decline of wetland condition; land easements, repair existing structures; no gain in area; only used in exceptional circumstances (USACE guidance).

The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions (proposed Section 404).

Re-establishment – gain in wetland area through rebuilding natural or historic functions to former wetland (USACE guidance).

Rehabilitation – no gain in wetland acres; repairing natural or historic functions to a degraded wetland (USACE guidance).

Restoration – return natural or historic functions to a degraded wetland (USACE guidance); reestablishment of an area that was historically wetlands or remains as a degraded wetland (WCA).

Manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: reestablishment and rehabilitation (proposed Section 404).

Resource Management Plan – (RMP) a plan to meet Minnesota state rules for a Comprehensive Wetland Protection and Management Plan (CWPMP) and following the process described in the Plan to meet regulatory obligations under Section 404.

Riparian Areas – transitional between terrestrial and aquatic ecosystems, through which surface and subsurface hydrology connects water bodies with their adjacent uplands. Riparian areas are adjacent to streams, lakes, and estuarine-marine shorelines and provide a

variety of ecological functions and services and help improve or maintain local water quality (proposed Section 404).

Scale of Degradation – severe, moderate, or minimal level of degradation due to a human-induced activity; relates to credit allocated for enhancement; quantified using MNRAM 3.0 questions for outlet condition (question 13)/vegetative quality (question 99): L=low, M=medium, H=high.

- Severe – L/L, M/L
- Moderate – L/M, M/M
- Marginal – L/H, H/L
- None – M/H, H/M, H/H

The scale is developed to better quantify the 1) WCA definition of 'a wetland that provides minimal wetland function and value due to human activities such as drainage, diversion of watershed, filling, excavating, pollutant runoff, and vegetative or adjacent upland manipulation' and 2) 'partial drainage'. Each wetland plant community type in a wetland complex shall be determined separately.

Upland Buffer –natural vegetation area contiguous with wetland that separates the resource from urban and agricultural areas to lessen the impact that activities in those areas can have on the wetland. Upland buffer can be used for wetland mitigation credit around an existing or mitigation wetland, if the average width is at minimum 25-50 feet and no less than 25 feet in any area, and it is contiguous with the wetland edge.

Upland Habitat Area –existing natural nonwetland habitat contiguous with an existing, restored, or created wetland. The area can be considered for habitat function mitigation credit if it is shown to be critical for special concern, threatened, or endangered species; or is at least 300 feet contiguous with the wetland edge and 300 feet or more beyond the wetland edge for this same distance.

Wetland Preservation Zone – high priority resources in the RMP watershed; fully described in Section IV.

APPENDIX I: MITIGATION ACTIVITY AND CREDITS

Among agencies, there are identical, overlapping and independent methods and applications of credit to wetland mitigation. Table 14 addresses compares mitigation activities and credits between the RCWD 53-62 RMP, Minnesota Rules, and the Federal Clean Water Act.. The RMP requirements are generally consistent with Minnesota and Federal requirements, and where permitting is different it is noted under the RMP. All mitigation activity terms in Table 14 are defined in Appendix H. Definitions.

In all cases the proposed credit is only awarded after performance standards have been achieved. All mitigation activities receiving credit must be protected by perpetual easement.

Replacement Method Order of Preference for Mitigation:

1) hydrologic and vegetative restoration of effectively drained or partially drained wetlands in WPZ
2) hydrologic and vegetative restoration of effectively drained or partially drained non-WPZ wetlands
3) native vegetation restoration, first for WPZ and then non-WPZ wetlands (above 1:1 replacement ratio)
4) Creation of infiltration BMPs that enhance water quality functions in conjunction with habitat restoration activities that enhance wildlife and vegetative integrity functions (above 1:1 replacement ratio).
5) all other mitigation activities in Table 14 are given equal preference

Replacement method preference is intended to address RCWD existing goals for protection and restoration of its natural resources. Guidance on water level monitoring protocol is being developed by an interagency group including BWSR and the Corps.

The RMP credit is not listed as new wetland credit or public value credit as in the WCA. The first three methods listed in Table 14 are eligible for fulfilling 1:1 replacement ratio. All other methods of replacement first require meeting 1:1 replacement. These methods and all remaining methods fulfill the replacement credit requirements.

Table 14. Comparative Summary of Mitigation Activity Credits (RMP, WCA, 404)

Replacement Method (terms in definitions)	**53-62 RMP (RCWD)**	**WCA/DNR without RMP (LGU)**	**Section 404 (Corps of Engineers)**	**Section 401 Certification (MPCA)**
**Hydrologic and vegetative restoration of historic wetland area that has been effectively drained or filled (Wetland Restoration)	100% Credit if high landscape function; 50% Credit if not high landscape function or outside the WPZ	100% NWC of area restored	100% of area restored	Up to 100% NWC of area restored depending on functional analysis
**Hydrologic restoration of partially drained wetlands	Scale of degradation score related to partial drainage: Severe: 75% Credit Moderate: 50% Credit Marginal: 25% Credit 50% if landscape function is not high or outside the WPZ	25% of area for NWC (regardless of functional analysis); must make up the remainder of the 1:1 NWC with another form of NWC	25-100% depending on function	Amount based on functional analysis
**Wetland creation or establishment	100% Credit if landscape function is high 50% Credit if landscape function is not high or outside the WPZ	100% NWC	50-100% depending on quality	Up to 100% NWC of total wetland area created based on functional analysis
Upland buffer as part of existing[1], restored or created wetland	25% Credit if wetland has high landscape function; 10% credit if wetland does not have high landscape function	100% PVC of upland buffer area up to size of replacement wetland	10-25% of upland buffer area depending on quality 100% if only used for credit above 1:1	Amount based on functional analysis
Upland habitat area as part of existing[1], restored created wetland	Up to 100% Credit depending on quality of upland and functions of wetland. Only for wetlands with high landscape function	25% NWC	25%	Amount based on functional analysis

Replacement Method (terms in definitions)	**53-62 RMP (RCWD)**	**WCA/DNR without RMP (LGU)**	**Section 404 (Corps of Engineers)**	**Section 401 Certification (MPCA)**
**Farmed wetland restoration of wetland vegetation where wetland hydrology is still intact (i.e., no ditches, tiles, etc.)	Up to 100% Credit depending on all functions	Up to 100% NWC based on 20 year history of farming frequency	Up to 100% depending on functions	Amount based on functional analysis
Restoration of native, noninvasive wetland vegetation on wetlands dominated by invasive or exotic spp.	Up to 100% Credit but only for wetlands with high landscape function	25% PVC of area vegetatively restored	Up to 100% of area restored depending on functional analysis	Amount based on functional analysis
Preservation of wetlands having "exceptional natural resource values"	Up to 50% Credit (RCWD and 404 requirements may in some cases differ)	Up to 12.5% NWC of wetland area preserved. Must involve restoration of hydrology or vegetation over 25% of wetland area 25% PVC of wetland area preserved	Up to 12.5% of wetland area preserved	Amount based on functional analysis
Preservation of other wetlands	25% Credit only if landscape function is high	No credit	Up to 12.5% of wetland area preserved that must be under demonstrable threat of loss or substantial degradation due to human activities tan might not otherwise be expected to be restricted.	Amount based on functional analysis

Replacement Method (terms in definitions)	**53-62 RMP (RCWD)**	**WCA/DNR without RMP (LGU)**	**Section 404 (Corps of Engineers)**	**Section 401 Certification (MPCA)**
Water quality treatment ponding areas	NA	100% NWC of normal pool area for downstream cell of 2-cell system if certain criteria are met. 100% PVC of isolated 1-cell system; upstream cell of 2-cell system; or one year design pool of stormwater infiltration area that has native, non-invasive vegetative cover	NA	NA
*Stormwater BMP: infiltration type	1 ac-ft of Infiltration Capacity = 1 Credit for approved design and location	NA	NA	NA
*Stormwater BMP: Vegetated Swale – infiltration type	1 ac-ft of Infiltration Capacity = 1 Credit	NA	NA	NA
*Stormwater BMP: Rain garden	1 ac-ft of Infiltration Capacity = 1 Credit	NA	NA	NA
*Storm water BMP: Green Roof	1 ac-ft of Infiltration Capacity = 1 Credit	NA	NA	NA
* These BMPs can only be used on the parcel or CDA where the impact occurs, for a maximum of half the credit above 1:1, and must be used in conjunction with habitat function replacement shown in Table 10. ** Eligible 1:1 credit [1] Existing does not apply to WCA and Section 404				

EXAMPLE LANDSCAPE WITH WETLAND IMPACT AND REPLACEMENT PLANS

A hypothetical landscape and parcel boundaries is shown in Map 1. Two hypothetical applications for wetland impacts and replacement are provided for Parcels A (upper left) and F (lower right) on Map 1 and Map 2. The Parcel F example is provided to demonstrate a concept plan which would not be feasible under sequencing analysis to avoid wetland impacts. The 8.85 acres proposed for fill would not likely make it through sequencing, and the applicant would be required to revise the project concept plan prior to continuing. The Parcel F example also demonstrates how such a project would likely be infeasible for economic reasons. Land prices in the City of Blaine would make the required mitigation extremely expensive. The parcel A example demonstrates a more feasible project that would likely make it through sequencing analysis. By devising these examples, it should not be assumed that the RCWD would approve or deny projects with similar characteristics.

The impact calculator is intended for use in early sequencing to look at both off-site and on-site alternatives that avoid impacts, and it is intended for use prior to preparing replacement plans. The impact calculator provides additional penalty for not avoiding certain wetland types, of a certain quality, and in certain locations. The impact calculator also must be used in evaluating potential mitigation sites that involve wetlands. As the impact-acres go up, the concern over successful mitigation also goes up. The mitigation plans will have to demonstrate replacement of the same type and functions, particularly the landscape level functions, with at least the same quality.

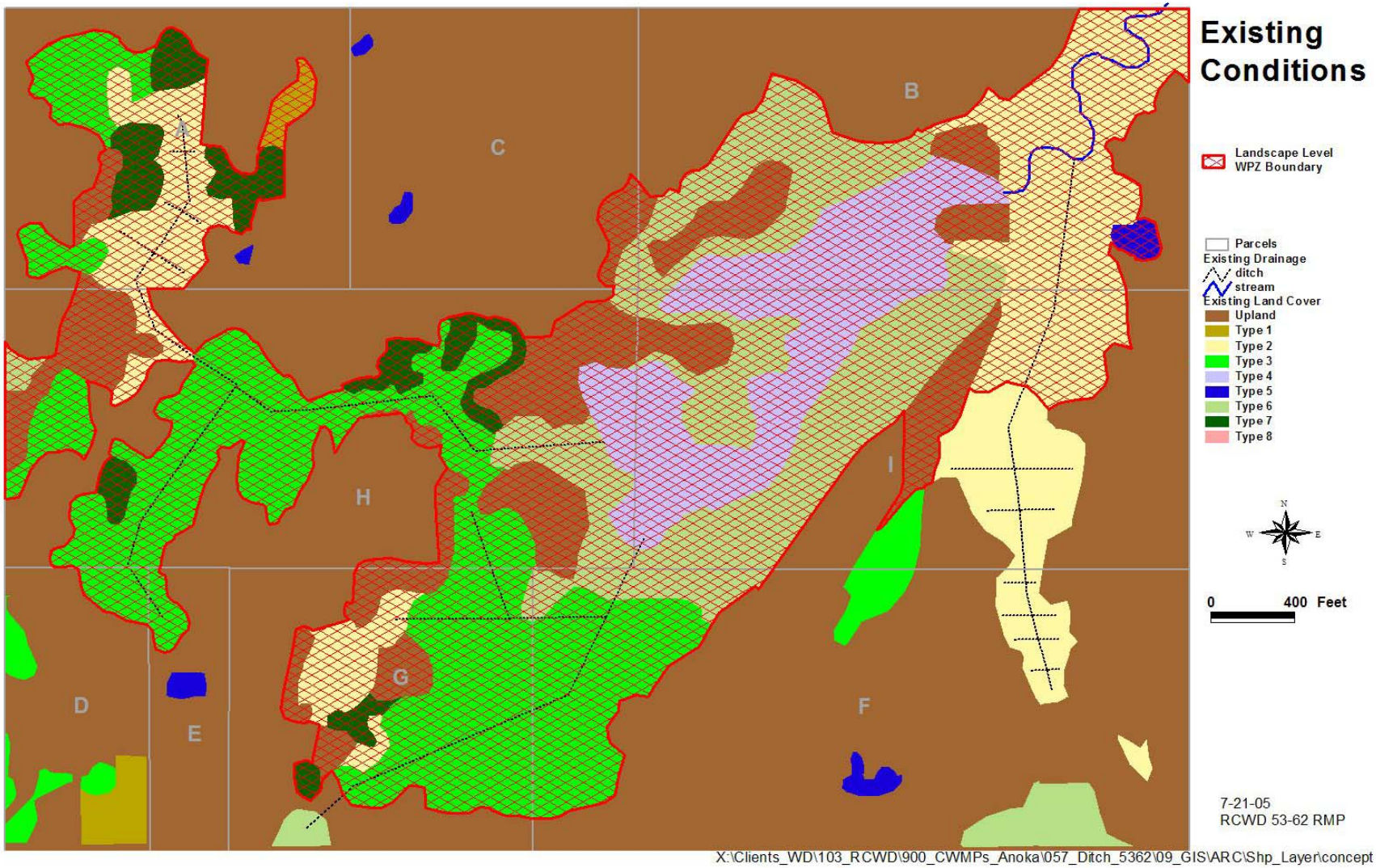
The mitigation credit calculator penalizes plans which do not locate replacement wetlands in high priority areas that provide landscape scale function of wetlands, including fragmentation/landscape connectivity. The WPZ encompasses areas with high landscape function.

Replacement methods with a * can be used to meet the wetland impact acres in Table 15 and 17. The * methods are equivalent to WCA new wetland credit and otherwise referred to as 1:1 acre for acre mitigation. Appendix H, Definitions, provides the Scale of Degradation for differentiating marginally, moderately, and severely degraded wetlands using two indicators of wetland function.

Parcel “A” has 1.67 acres directly impacted (see Table 15) and has calculated 4.22 impact-acres. The Parcel “A” replacement plan (Table 16) has 8.72 acres eligible for wetland credit and thus meets the 1:1 replacement requirement for wetland impact–acres assuming that the mitigation plan meets wetland type replacement. Computing 8.72/1.67 gives the ‘Wetland Acre Ratio’ shown in Table 17. Table 16 also shows total replacement credits. This is the sum of 8.72 plus all other credits shown in the Credits Total column. As shown in Table 17, this replacement plan has a ‘Wetland Mitigation Ratio’ based upon 12.11/4.22, or the ratio of total replacement credits to total impact debits.

In contrast, Parcel “F” is a hypothetical proposal that would have a difficult time meeting sequencing and does not meet the minimum mitigation standards under the RMP Rule.

Map 1. Existing Conditions



Map 2. Example Development Plan-for Parcels A and F under RMP Conditions

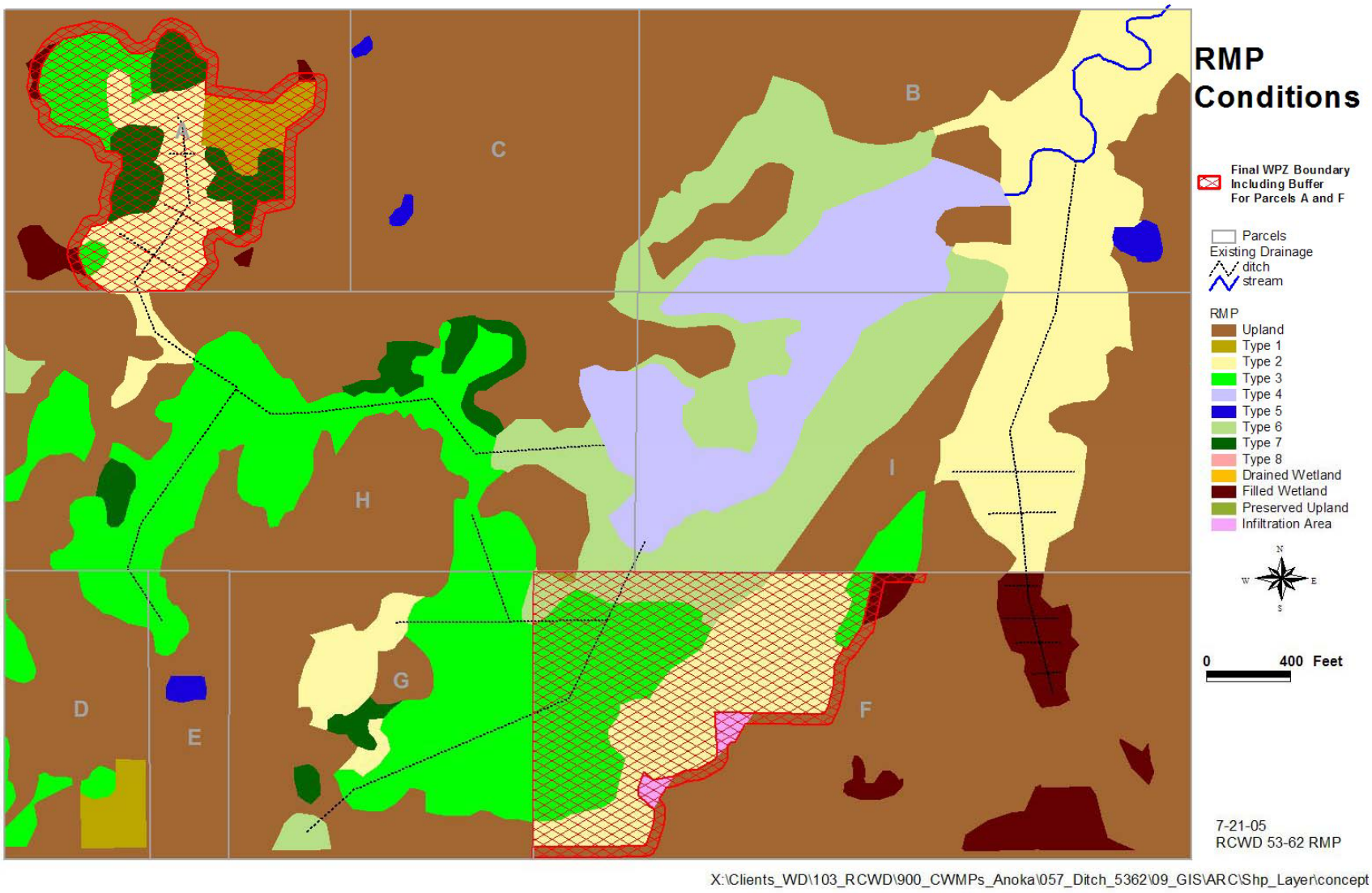


Table 15. Sample Wetland Impact Calculator for Parcel "A"

		In Prelim WPZ		Out Prelim WPZ		In + Out
Existing Wetland Type	**Ratio**	Acres	Impact Debits Subtotal (2x ratio)	Acres	Impact Debits Subtotal (1x ratio)	Impact Debits Total
Degraded shallow, deep marshes or open water	1.0		0	**0.116**	0.12	0.12
Non-Degraded shallow, deep marshes or open water	1.25	**1.414**	3.54		0	3.54
Degraded sedge meadow, wet meadow, or wet to mesic prairie	1.0		0		0	0
Non-Degraded sedge meadow, wet meadow, or wet to mesic prairie	1.5		0		0	0
Degraded shrub carr or alder thicket	1.0		0		0	0
Non-Degraded shrub carr or alder thicket	1.5		0		0	0
Degraded hardwood, coniferous swamp, floodplain forest, or bog	1.25		0		0	0
Non-Degraded hardwood, coniferous swamp, floodplain forest, or bog	2	**0.14**	0.56		0	0.56
Degraded seasonally flooded basin	1.0		0		0	0
Non-Degraded seasonally flooded basin	1.25		0		0	0
Impact Calculator Summary						
Wetland Acres	**1.67**		**1.554**		**0.116**	
Impact Acres	4.22					4.22

Table 16. Sample Mitigation Credit Calculator for Parcel "A"

			In Final WPZ		Out Final WPZ		In + Out
Replacement Method	Eligible for wetland impact acres	**Ratio**	Acres	Credits Subtotal	Acres	Credits Subtotal	Credits Total
Hydrologic and vegetative restoration of effectively drained or filled wetland	*	1		0		0	**0**
Hydrologic and vegetative restoration of partially drained marginally degraded wetlands	*	0.25	0.37	0.09		0	**0.09**
Hydrologic and vegetative restoration of partially drained moderately degraded wetlands	*	0.5	5.26	2.63		0	**2.63**
Hydrologic and vegetative restoration of partially drained severely degraded wetlands	*	.75	5.3	3.98		0	**3.98**
Wetland establishment (creation) in low quality upland	*	1	2.02	2.02		0	**2.02**
Upland buffer as part of an enhancement, creation, or restoration		0.25	5.34	1.34		0	1.34
Ecological enhancement in WPZ uplands		0.5		0		0	0
Vegetation restoration on farmed wetlands		.75		0		0	0
Vegetation restoration of invasive or exotic dominated wetland.		0.5		0		0	0
Preservation of high functioning wetlands		0.25	8.19	2.05		0	2.05
Preservation of wetlands having "exceptional natural resource values"		0.5		0		0	0
Stormwater infiltration BMP: (1 ac-ft = 1 acre credit)		1	Ac-ft	0	Ac-ft	0	Ac-ft 0
Replacement Calculator Summary							
New or restored credits	**8.72**						**8.72**
Total replacement credits	12.11						12.11

Table 17. Sample Wetland Replacement Ratio Calculator for Parcel "A"

Replacement Ratio Calculator		**Ratio**
Wetland Acre Ratio must meet minimum of ratio 1:1 (proportion of total new wetland mitigation to total wetland impact in acres)	8.72/1.67	**5.22 : 1**
Wetland Replacement Ratio must meet minimum ratio of 2:1. (proportion of total replacement credits to total impact acres)	12.11/4.22	**2.87 : 1**

Note: This plan meets the 2:1 and is acceptable provided in-kind replacement is met.

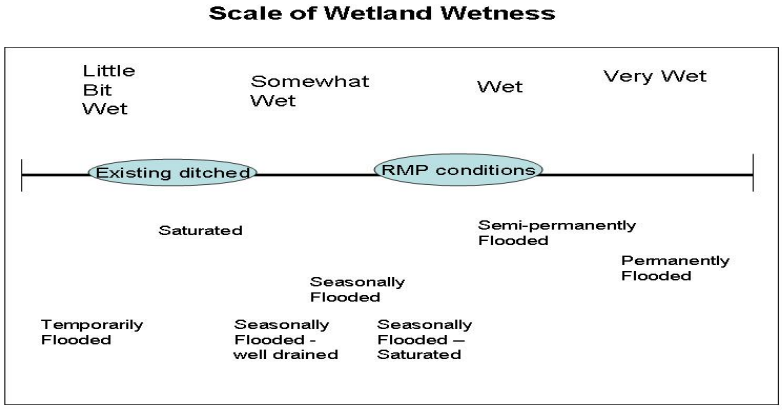
APPENDIX J: RMP WETLAND MANAGEMENT AREA GOALS AND CONCEPT PLANS

GOALS

Goals have been established for each management area for ditch repair and wetland hydrologic restoration. The implementation of management area goals will be phased in over a period of time. The phasing for each management area is prioritized in Table 21 based upon a logical sequence of development and restoration strategies for the entire RMP area. All activities will be subject to permit review. Permit conditions will be written to address risks of unanticipated drainage from RMP ditch repair.

It is worth revisiting Section III of this document for the criteria that define the feasible repair and RMP repair for the 53-62 ditch system. One intent of the RMP repair is to avoid draining wetlands requiring replacement under the drainage exemption in WCA. This includes all Type 3,4,5 and PWI wetlands. Thus, extent of ditch channel repair/redesigns is dependent on the kind of associated wetland.

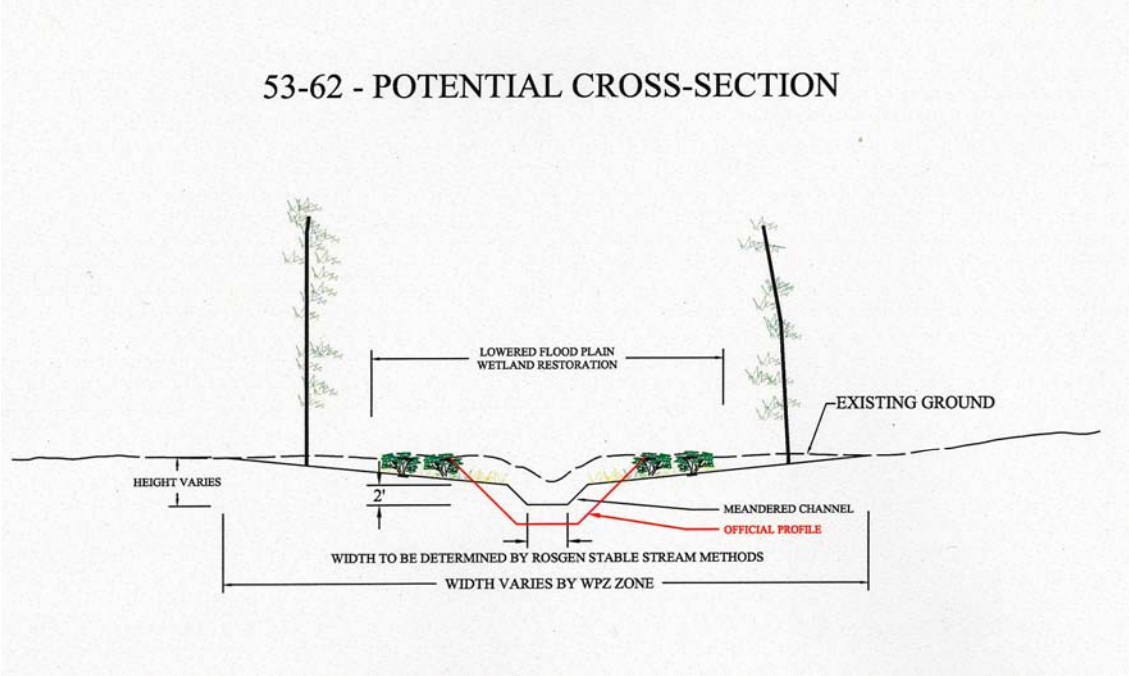
The other, watershed management-based intent of all proposed channel excavations and outlet control structures is to restore the hydrologic storage capacity that is missing in some management areas. In general it is assumed that the unditched storage capacity is greater than the ditched capacity. The wetland hydrologic capacity can be related to a sliding scale of wetland wetness using the water regime modifiers described by the Cowardin classification system.



This scale of wetland wetness is the working model for developing the concept plans and ultimately final design to compute actual hydrologic storage capacity. In general many of the existing wetlands have been impacted by drainage. One goal of the RMP is to restore those wetlands to a more natural hydrologic regime. There are several context-sensitive parameters to be incorporated into the restoration design and monitoring/adaptive management. These are:

- The watershed drainage area characteristics in an urbanizing landscape. There has to be a threshold below which the wetland system can 'multi-function' and not become a stormwater system. Crossing the threshold might trigger deterioration into a stormwater conveyance system; this is being addressed by means of the RMP Rule through infiltration practices in the watershed. Monitoring and adaptive management of redesigned channels/restored wetlands would be needed where watershed land use changes are occurring.
- The desired hydrologic regime of the wetland system. It is a given that the wetland system is predominantly driven by flow-through surface water and ground water, with seasonal fluctuation in both; within this prevailing hydrologic landscape, channel repair is intended to establish hydrologic diversity ranging from saturated to semi-permanently flooded. Monitoring and adaptive management would be used to assess the accuracy of the design parameters in reaching the goal and rectify significant variations. A range of acceptable range of hydrologic variability would be established and monitoring/management would be geared to maintaining within the range.
- Flood elevation limits based upon buildings in the surrounding drainage area; proposed wetland water level elevations will be restricted by flood elevations that will cause damage to buildings on adjacent uplands.
- Wetland complexity and diversity of hydrologic regimes in each management area. Multiple wetland types and regimes and microsite diversity will need to be surveyed for final design; monitoring/adaptive management will be used to evaluate increases or decreases in diversity and maintain hydrologic/biologic diversity.

Channel repair under the RMP is generally described as reconstruction to a 'stable stream' configuration. In some areas this will include shallow wetland excavation to create a widened plain for channel migration and wetter wetland hydrologic regime. The typical configuration for this stable stream is illustrated below. Channel repair under the full repair scenario would restore the ditch to its officially adopted profile. The full repair is based on historic ditch records, whereas the stable stream configuration is based on the flow conditions that occur, providing adequate conveyance and less maintenance due to appropriate sizing.



INDIVIDUAL MANAGEMENT AREA CONCEPT PLANS

Management area locations are shown in Figure 10, and the management area activities are summarized in Table 18. Following this, data on each management area are given. Also provided for each area are the results of hydrologic modeling showing ditch water elevations under the alternative scenarios. By using the H&H modeling, predictions have been made as to the potential hydrologic storage capacity that can be restored in each area.

In summary the basis of each concept plan was based on the following data:

- 2-foot contour and sometimes 1-foot spot elevations of wetland surfaces
- Ditch water elevations derived from models under existing and repair alternatives conditions (summarized in *H&H Results for each management area*)
- Extent of drainage predicted by lateral effect model (indicator of drainage which may have occurred historically) – shown in individual management area maps
- Wetland classification
- Wetland functions
- Scale of degradation of partially drained wetlands

For proposed excavation in wetlands as a result of channel reconstruction, the mitigation replacement is proposed as hydrologic restoration of partially drained wetland. Table 18 provides the wetland management area size and thus area to be investigated for estimating area of partially drained and degraded wetland. It is assumed that existing Type 2 wetlands with ditches are partially drained. The results of this investigation will be the basis for establishing the restoration credit. Guidance documents found in Appendix N for determining drainage extent and degradation will be followed.

Table 18: Implementation Priority and Channel Reconstruction/Hydrologic Restoration Strategy for Each Management Area

Area	Current Priority	Proposed Activities (includes excavation in wetland for ditch reconstruction)	Wetland Replacement Needed for Excavation in Wetlands During Channel Reconstruction	Wetland Management Area Size (acres)	Hydrologic Restoration Credit Area (to be determined in permitting)
MB.A (V.M.)	High	Creation of flow-through wetland to provide water quality improvement for entire drainage area.	yes	65	
MB.B (V.M.)	Medium	Limited excavation to create flow-through wetland connection	yes	44	
MB.C (V.M.)	High	Creation of flow-through wetland to provide water quality improvement for branches 1, 2 and 5.	yes	69	
B1.A	Medium	Creation of 2-stage channel	yes	105	
B1.B	High	Creation of flow-through wetland and control structure upstream of Hupp Street.	yes	170	
B1.C	Medium	Construction of 2-stage channel. Limited creation of flow through wetlands.	yes	102	
B1.D	Low	Limited channel modification to create flow through wetlands.		18	
B1.E	Low	No ditch modifications, wetland preservation.		98	
B1.F	Low	No ditch modifications, wetland preservation		68	
B1.G	Low	No ditch modifications, existing wetland mitigation site.		13	
B2.A	High	Creation of flow-through wetlands and control structure upstream of Austin Court.	yes	400	
B2.B	Medium	Construction of 2-stage channel	yes	89	
B5.A	High	Creation of flow-through	yes		

		wetland will provide water quality treatment for branches 1, 2 and 5. Construction of weir between B5.A and MB.C.		107	
B5.B	Low	No ditch modifications, wetland preservation		160	
B5.C	High	Wetland preservation. Control structure and possible culvert construction needed to route flows north under 109th Avenue.		49	
B5.D	High	Creation of flow-through wetland will provide water quality improvement for branch 5. Storm flows routed to B5.C then north under 109th Avenue.	yes	55	
B5.E	Medium	Creation of 2-stage channel	yes	36	
B5.F	Low	No ditch modifications, wetland preservation		166	
B6.A	Medium	Creation of 2-stage channel	yes	35	
B6.B	Low	No ditch modifications, wetland preservation		13	
B6.C	Low	No ditch modifications, wetland preservation		119	

Ditch Water Level Elevations Guide Restoration Design

In each of the following concept plans, the existing and future condition ditch water levels were used to determine the extent of unused hydrologic capacity of each wetland management area, in so far as the ditch contribution is concerned. These elevations are the result of hydrologic modeling. Existing means the water elevation in the ditch as exists today. The other three scenarios (Feasible Repair, No Action, RMP) represent future watershed development conditions and any proposed changes in the ditch. Hydrologic models prepared in the past include the 100-yr WSB (the entity preparing the model) and 100-yr snow. The 100-yr EOR was recently used with more refined model data. These 100-yr models represent bigger storms. The 1-yr 8-day average represents the smaller storms that would tend to occur more commonly throughout the rain season. When the ditch water elevation less than the range of adjacent wetland elevations then it is expected that after storms the water is confined to the ditch and does not spill onto the wetland surface. This means there may be unused hydrologic capacity for that wetland, in so far as the ditch channel is removing water and bank overflows are not contributing to the wetland. The RMP

ditch elevations reflect the RMP hydrologic model using the watershed standards given in the RMP Rule for infiltration.

To refine the concept plans, new data will needed to be collected. This may include ditch bank elevations at additional locations along the channel, spot elevations of various wetland microsite locations and/or 0.5-foot wetland contours, and investigation of nonditch hydrologic contributions (adjacent upland runoff, groundwater).

Branch 1
B1.A- Branch 1, Zone A

Location: East of Lexington Avenue. West Section 13.

H&H Results Showing Ditch Water Elevation (in feet)

	Existing	Feasible Repair	No Action	RMP
	HWL	HWL	HWL	HWL
100-yr WSB*	897.0	-	897.0	-
100-yr Snow WSB*	897.2	-	-	-
100-yr EOR*	896.8	897.0	-	-
1-yr 8-day average*	895.7	893.7	-	-

*Does not include area south of 111th Avenue

Existing wetland elevations within this zone range from 898 to 896. An area within the WPZ to the south is presumably under no ditch influence. The wetland in the vicinity of the ditch is receiving occasional flood water (100-yr storms) but not water from common, 1-yr storms. Additional sources beyond ditch overflows are assumed to be contributing to and maintaining the wetter wetland types in this area. Permit-level field investigations will be needed to further assess wetland hydrology, types, and boundaries.

DNR-protected wetlands exist within this zone. Hydrologic manipulation from existing conditions or excavation is not proposed. The ditch section through this zone will be redesigned to a two-stage natural channel or stable stream. This zone will also include vegetative management and preservation.

B1.B- Branch 1, Zone B

Location: East of Hupp Street. South Section 12, North Section 13.

H&H Results Showing Ditch Water Elevation (in feet)

	Existing	Feasible Repair	No Action	RMP
	HWL	HWL	HWL	HWL
100-yr WSB	897.6	-	897.7	-
100-yr Snow WSB	898.2	-	-	-
100-yr EOR	897.3	897.2	-	-
1-yr 8-day average	893.7	895.7	-	895.7-897.7

Existing wetland elevations within this zone range from 898 to 897. Currently the wetland may receive some spring flooding and 100-yr floods from the ditch. Only the more common 1-yr storm model was run under the RMP conditions. In this case the wetland may receive ditch water overflows. The RMP 100-yr flood also would be expected to provide flood water to much of the wetland. Based upon the RMP modeling, the expected shallow marsh elevation is a range of 895.5-897.5. The existing wetland types and hydrologic regime are wetter than might be expected from receiving bank overflow water only. Additional hydrologic sources are likely contributing. Future investigations are warranted before proceeding with final design.

At this point an outlet structure is proposed upstream of Hupp Street to increase hydrologic storage of the entire zone, shifting the area to a wetter regime. More detailed information will be needed before implementation.

Excavation of low quality wetlands may be used to create a flow-through wetland system along the ditch alignment. The flow-through wetland will consist of heavily vegetated emergent species and limited open water. This zone will include vegetative management and preservation. Preservation of wooded fringe wetlands and adjacent uplands will be important in this zone.

B1.C- Branch 1, Zone C

Location: South of Main Street. North Section 12

H&H Results Showing Ditch Water Elevation (in feet)

	Existing	Feasible Repair	No Action	RMP
	HWL	HWL	HWL	HWL
100-yr WSB	897.6	-	897.7	-
100-yr Snow WSB	898.4	-	-	-
100-yr EOR	897.7	897.6	-	
1-yr 8-day average	894.0	897.0	-	897.0-897.7

Existing wetland elevations within this zone range from 898 to 897. Under existing conditions the ditch may provide some water to the wetland under 100-yr flooding. It appears that the ditch is providing partial drainage and there is unused hydrologic capacity. Under RMP conditions the common storms would be expected to flood this wetland. It is presumed that larger storms would definitely flood into this area. The shallow marsh type of hydrology (C modifier) would be expected at 897-897.5 feet based upon the RMP model. This would suggest that future wetland type would shift to a wetter regime.

Limited excavation of low quality wetlands will create a diversity of wetland habitat throughout this zone. The ditch will be redesigned to a stable stream configuration. The hydrology of the zone will be controlled by the structure upstream of Hupp Street to regulate hydrologic storage capacity and thus wetland hydrologic regime. These strategies will not impact the large mitigation site located in the northeast corner of the zone. This zone will include vegetative management and preservation. Preservation of wooded fringe wetlands and adjacent uplands will be important in this zone.

B1.D- Branch 1, Zone D

Location: North of Main Street. South Section 1

H&H Results Showing Ditch Water Elevation (in feet)

	Existing	Feasible Repair	No Action	RMP
	HWL	HWL	HWL	HWL
100-yr WSB	898.7	-	898.7	-
100-yr Snow WSB	899.4	-	-	-
100-yr EOR	898.6	898.2	-	
1-yr 8-day average	898.0	894.3	-	898

Existing wetland elevations within this small area are about 897. Thus, the wetland should be receiving flood water from both the common and larger storms, as well as spring flooding. Since the wetland hydrologic regime is on the drier side of the scale, the wetland may be quite dependent on this occasional overbank flooding. The RMP modeling suggests that a shallow marsh hydrology will form at elevation 897-897.5 feet.

Limited excavation and a slight modification to the existing ditch is currently proposed for this area. The culvert at Main Street does not need to be improved. This zone will include vegetative management and preservation.

B1.E- Branch 1, Zone E

Location: West of Lever Street. South Section 1

H&H Results Showing Ditch Water Elevation (in feet)

	Existing	Feasible Repair	No Action	RMP
	HWL	HWL	HWL	HWL
100-yr WSB	899.1	-	899.1	-
100-yr Snow WSB	899.6	-	-	-
100-yr EOR	898.6	898.2	-	-
1-yr 8-day average	898.0	894.3	-	898

Existing wetland elevations within this zone are between 899-898. The existing conditions models indicate this area receives spring snowmelt from ditch overflow, as well as overflows from more common storms. The RMP conditions would not change this. The existing wetland typing/hydrologic regime is consistent with the modeling. The RMP model indicates that shallow marsh hydrology (C modifier) is at 897-897.5 feet which is consistent with the mapping of a B modifier hydrologic regime. This wetland is apparently drier than might be expected without the ditch.

High quality wetlands exist within this zone and will be protected. Although there is potential storage, hydrologic manipulations to the wetlands are not proposed nor are ditch modifications. This zone will include vegetative management and preservation.

BRANCH 1, LATERAL 1

B1.F- Branch 1, Zone F

Location: North of 109th Avenue. Center Section 13

H&H Results Showing Ditch Water Elevation (in feet)

	Existing	Feasible Repair	No Action	RMP
	HWL	HWL	HWL	HWL
100-yr WSB*	898.3	-	898.4	-
100-yr Snow WSB*	898.5	-	-	-
100-yr EOR*	898.5	898.1	-	-
1-yr 8-day average*	897.5	895.5	-	897.5

*Not applicable to the area north of Lochness Lake Outlet

Existing wetland elevations within this relatively narrow zone are between 898-897. The model for smaller storms (1-yr) predicts that ditch overflow is expected under RMP conditions. The shallow marsh hydrologic regime under RMP conditions is expected at 897

feet. This is somewhat consistent with the wetter hydrologic regime of mapped wetlands. Additional sources may be contributing to hydrology. Under RMP conditions the hydrologic regime is expected to stay the same, with limited flooding under common storm events.

Many DNR-protected waters exist within this zone and will be protected. The temporary/less wet hydrologic regime of fringe wooded wetlands is anticipated to stay the same (at least from the perspective of hydrologic contributions from the ditch channel). Hydrologic manipulations to the wetlands are not proposed nor are ditch modifications. Loch Ness Lake is located within this zone. This zone will include vegetative management and preservation.

B1.G- Branch 1, Zone G

Location: South of 109th Avenue. North Section 24
Map not provided.

H&H Results Showing Ditch Water Elevation (in feet)

	Existing	Feasible Repair	No Action	RMP
	HWL	HWL	HWL	HWL
100-yr WSB	898.9	-	899.1	-
100-yr Snow WSB	898.9	-	-	-
100-yr EOR	899.5	899.2	-	-
1-yr 8-day average	898.7	896.2	-	-

This zone consists almost entirely of a mitigation site. No ditch or hydrologic modifications are proposed. Vegetation management will be included.

BRANCH 2 AND 3

B2.A- Branch 2, Zone A

Location: West of Lexington Avenue. South Section 11, North Section 14.

H&H Results Showing Ditch Water Elevation (in feet)

	Existing	Feasible Repair	No Action	RMP
	HWL	HWL	HWL	HWL
100-yr WSB	896.9	-	897.0	-
100-yr Snow WSB	897.1	-	-	-
100-yr EOR	896.8	896.7	-	-
1-yr 8-day average	895.1	893.4	-	896.5

Existing wetland elevations within this zone range from 897 to 896. This means that under existing conditions the ditch is not overflowing during common storms, is partially draining

the wetland, and there is unused hydrologic capacity. Under the RMP scenario the ditch is expected to overflow to the wetland for the common storm events, and thus presumably larger events, with an expectation that wetland hydrology will become 'wetter'. The shallow marsh, C modifier hydrology is predicted to be at 895 feet under RMP conditions, a foot below the wetland surface. The existing wetland is mapped with a C modifier for hydrology. This suggests hydrologic sources other than the ditch are maintaining this wetland hydrology. More detailed information will be needed before implementation.

Preservation of wooded fringe wetlands and adjacent uplands will be important in this zone. Excavation of low quality wetlands will create a flow-through wetland system along the ditch alignment. The flow-through wetland will consist of heavily vegetated emergent species and limited open water. All intact ditch sections will be redesigned to a stable stream configuration. An outlet structure will be constructed upstream of Austin Court to regulate hydrology and storage in the entire zone. This zone will include vegetative management and preservation.

Branch 2, Peebles and Devine Lateral
B2.B- Branch 2, Zone B

Location: South of Main Street. North Section 11

H&H Results Showing Ditch Water Elevation (in feet)

	Existing	Feasible Repair	No Action	RMP
	HWL	HWL	HWL	HWL
100-yr WSB	896.9	-	897.0	-
100-yr Snow WSB	897.1	-	-	-
100-yr EOR	896.8	896.7	-	-
1-yr 8-day average	895.1	893.4	-	896.5

Existing wetland elevations within this zone range from 899 to 897. This wetland is not predicted to receive flood waters from the ditch under the existing conditions. Under RMP conditions ditch bank overflows are still not expected to contribute under smaller storms, and C modifier hydrology would be expected at an elevation of 895 feet. According the existing wetland mapping the hydrology of this wetland is in part already a C modifier (part of it is a B modifier). This suggests additional field data is needed for the models, or that additional sources contribute to the wetland. At this point the ditch is proposed to be redesigned to a stable stream configuration and provide additional hydrologic storage that may now be lacking in at least part of this wetland.

Limited excavation of low quality wetlands will create a diversity of wetland habitat throughout this zone. Preservation of wooded fringe wetlands and adjacent uplands will be important in this zone. This zone will include vegetative management and preservation.

BRANCH 5, LATERAL 1

B5.B- Branch 5, Zone B

Location: North of 109th Avenue. Southeast Section 15.

H&H Results Showing Ditch Water Elevation (in feet)

	Existing	Feasible Repair	No Action	RMP
	HWL	HWL	HWL	HWL
100-yr WSB	896.8	-	896.9	-
100-yr Snow WSB	896.9	-	-	-
100-yr EOR	-	-	-	-
1-yr 8-day average	-	-	-	-

Existing wetland elevations within this zone range from 897 to 895. Wetlands are general of a C modifier hydrology. No hydrologic manipulations, excavation or ditch modifications are proposed for this zone, and thus no future conditions modeling was performed. Flow from this zone will be routed to B5.A.

DNR protected and high quality wetlands exist within this zone. This zone will include vegetative management and preservation of wetlands and adjacent uplands.

B5.E- Branch 5, Zone E

Location: North of Radisson Road. South Section 22

H&H Results Showing Ditch Water Elevation (in feet) *

	Existing	Feasible Repair	No Action	RMP
	HWL	HWL	HWL	HWL
100-yr WSB	904.2	-	904.2	-
100-yr Snow WSB	904.1	-	-	-
100-yr EOR	901.0	901.1	-	-
1-yr 8-day average	900.4	896.3	-	-

* Water levels vary based on position along ditch.

Existing wetland elevations within this zone range from 903 to 901. It would appear that a source other than the ditch is contributing hydrology to maintain the C and F modifier wetland hydrology.

A DNR-protected wetland is within this zone and no hydrologic modifications are proposed. The ditch will be redesigned to a stable stream configuration. This zone will include

vegetative management and preservation. Preservation of wooded fringe wetlands and adjacent uplands will be important in this zone.

BRANCH 5, LATERAL 2 PRIVATE

B5.F- Branch 5, Zone F

Location: South of Radisson Road. Northwest Section 27

H&H Results Showing Ditch Water Elevation (in feet)

	Existing	Feasible Repair	No Action	RMP
	HWL	HWL	HWL	HWL
100-yr WSB	904.3	-	904.3	-
100-yr Snow WSB	904.6	-	-	-
100-yr EOR	902.7	902.0	-	-
1-yr 8-day average	901.9	897.5	-	-

Existing wetland elevations within this diverse and complex area range from 905 to 902. Ditch bank overflow is expected under larger storm for existing conditions, but based upon the kinds of existing wetland hydrology, it is likely that other sources contribute. The ditch likely has no influence on a large part of this area. No modifications to the private ditch are proposed.

DNR protected wetlands are found throughout this zone as well as high quality plant communities. This zone will include vegetative management and preservation. Preservation of wooded fringe wetlands and adjacent uplands will be important in this zone.

BRANCH 6, LATERAL 1 PRIVATE

B6.B- Branch 6, Zone B

Location: West of Naples Street. Southeast Section 21

H&H Results Showing Ditch Water Elevation (in feet)

	Existing	Feasible Repair	No Action	RMP
	HWL	HWL	HWL	HWL
100-yr WSB	903.3	-	903.3	-
100-yr Snow WSB	903.7	-	-	-
100-yr EOR	-	-	-	-
1-yr 8-day average	-	-	-	-

Existing wetland elevations within this zone range from 902 to 901. Ditch overflow may be providing a fair amount of the hydrology to maintain the shallow marsh wetland conditions. No recent modeling was performed. No modifications to the private ditch are proposed.

B6.C- Branch 6, Zone C

Location: South of 101st Avenue. Northeast Section 27

H&H Results Showing Ditch Water Elevation (in feet)

	Existing	Feasible Repair	No Action	RMP
	HWL	HWL	HWL	HWL
100-yr WSB	904.9	-	905.0	-
100-yr Snow WSB	905.0	-	-	-
100-yr EOR	-	-	-	-
1-yr 8-day average	-	-	-	-

Existing wetland elevations within this zone range from 905 to 902. Most of this area is presumed to be under no ditch influence. No modifications to the private ditch are proposed.

DNR-protected wetlands are found throughout this zone as well as many high quality wetland plant communities. This zone will include vegetative management and preservation. Preservation of wooded fringe wetlands and adjacent uplands will be important in this zone.

Appendix K: Wetland Functional Assessment and Public Values

PUBLIC VALUES

A public open house was held to determine the local public values with regard wetland functions. The results are summarized here.

A total of **30** usable survey cards were returned (one card was not usable because the same ranking number was used multiple times). **Twenty-two** of the 30 surveys were from individuals who identified themselves as landowners within the RMP area. Open house attendees were asked to rank 8 wetland functions and 1 use (conversion of upland for development) in order of importance from 1 (most important) to 9 (least important). The following is a summary of those results.

Wetland Function	Mean Score Landowners (22)	Mean Score Non-landowners (8)	Mean Score All respondents (30)
Surface Water Quality	**3.9**	**2.1**	**3.4**
Wildlife Habitat	**2.6**	**2.9**	**2.7**
Conversion to Upland for development	**5.8**	**7.7**	**6.3**
Commercial use of wetlands	**7.0**	**7.7**	**7.2**
Recreation/Education Uses	**5.7**	**5.4**	**5.6**
Flooding Prevention	**4.2**	**5.2**	**4.4**
Ecological Diversity	**5.7**	**3.3**	**5.0**
Groundwater Quality	**4.3**	**3.1**	**4.0**
Wetland Aesthetics	**5.5**	**6.9**	**5.9**

Based on the mean data presented above, the ranking of wetland values was as follows:

Landowner Ranking (importance from highest to lowest):
Wildlife Habitat
Surface Water Quality
Flooding Prevention
Groundwater Quality
Wetland Aesthetics
Ecological Diversity & Recreation/Education Uses (tie)
Conversion to Upland for development
Commercial use of wetlands

Non-Landowner Ranking (highest to lowest):
Surface Water Quality
Wildlife Habitat
Groundwater Quality
Ecological Diversity
Flooding Prevention
Recreation/Education Uses
Wetland Aesthetics
Conversion to Upland for development & Commercial use of wetlands (tie)

Overall Ranking (highest to lowest):
Wildlife Habitat
Surface Water Quality
Groundwater Quality
Flooding Prevention
Ecological Diversity
Recreation/Education Uses
Wetland Aesthetics
Conversion to Upland for development
Commercial use of wetlands

Six written comments were received from open house attendees. **Three** of the 6 comments were related to tree removal and ditch cleaning activities outside the RMP area and were not related in any way to the plan. The remaining 3 applicable comments are summarized as follows:

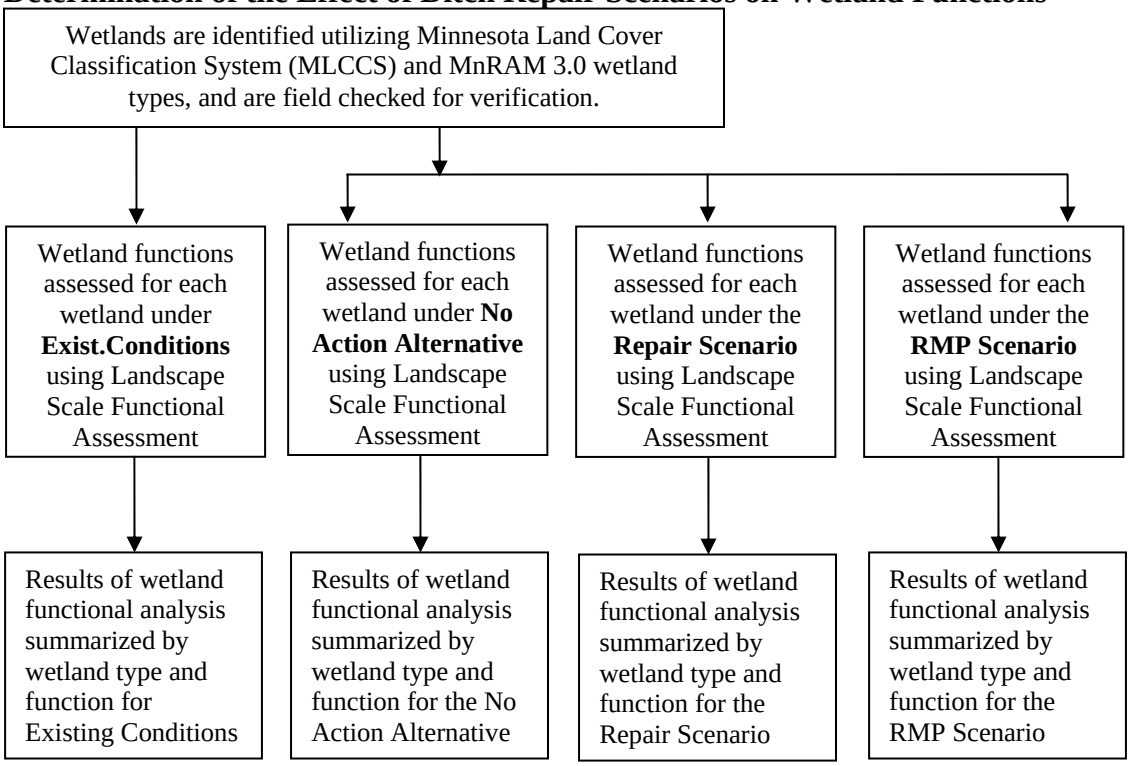
One commenter expressed appreciation for the District Administrator taking time to answer questions and for coming up with a plan to resolve the issues.

One commenter said that the ditch should be 4 feet deeper than it is now and that there is sometimes standing water on his/her property. The commenter stated that if the ditch was lowered by 4 feet like the original plan, then mosquito control would not have to spray as much and mosquitoes would be reduced.

One commenter stated that wetland destruction endangers the water supply, results in loss of wildlife, and destroys the "Oak Plain". The commenter also stated that development can be detrimental, and that they hoped the District "knows what it is doing".

The following flowchart explains the sequence of events taken in order to obtain Functional Assessment results to compare among ditch repair alternatives:

Determination of the Effect of Ditch Repair Scenarios on Wetland Functions



For the purpose of effects of ditch repair alternatives on wetland functions, provided here are the Functional Assessment results for each RMP WPZ Management Area outside the original Village Meadows boundaries. For each Zone, a chart depicting the Functional Assessment Analyses is then provided. Protocol followed for Functional Assessment Analysis was built upon TEP-reviewed memos provided in the separate Technical Supplement. Please refer to Appendix N for full descriptions of how MnRAM 3.0 attributes were answered for analyzing wetland functions in the Existing Conditions scenario. For all three repair alternatives and their corresponding future development scenarios, no wetland basins are assumed to be filled. Additional assumptions were made for each of the three repair alternatives and Functional Assessment protocol for assessing fully developed scenarios are summarized as thus:

FUNCTIONS

Following is an explanation of how the three ditch repair alternatives were evaluated using the functional assessment method developed for the RMP.

FEASIBLE REPAIR, FULLY DEVELOPED

To consider which wetland basins would be modified following a feasible ditch repair scenario, two-foot contours were used to analyze which basins would become partially drained and therefore "affected" by the feasible repair. All other "unaffected" basins were

assumed to have no hydrologic changes. Any changes in hydrology for partially drained wetlands modified the following wetland attributes: outflow control, amphibian breeding potential, amphibian overwintering, and vegetative quality. The following hydrologic changes were assumed for "affected" wetland basins:

Type 1 would become "partially drained" Type 1
Type 2 would become Type 1
Type 3 would become Type 2
Type 4 would become Type 3
Type 5 would become Type 4
Type 6 would become "partially drained" Type 6 (shrub swamps)
Type 7 would become "partially drained" Type 7 (wooded swamps)
Type 8 would become "partially drained" Type 8 (bogs)

The assumption was made that all upland areas will become developed upon, therefore negatively affecting the following wetland attributes for wetland basins bordered by currently undeveloped upland: impervious drainage area, upland buffer width for water quality, upland buffer width for wildlife, fragmentation, sediment delivery, pollutant discharge, and vegetative quality. Ditches to be excavated for feasible repair actions would also negatively affect those wetland basins intersected by downgrading the soil integrity attribute.

NO ACTION, FULLY DEVELOPED

No hydrologic modifications were assumed to affect any wetland basins in a "no action" scenario. The assumption was made however, that all upland areas will become developed upon, therefore negatively affecting the following wetland attributes for wetland basins bordered by currently undeveloped upland: impervious drainage area, upland buffer width for water quality, upland buffer width for wildlife, fragmentation, sediment delivery, pollutant discharge, and vegetative quality.

RESOURCE MANAGEMENT PLAN (RMP), FULLY DEVELOPED

All wetland basins occurring within a "RMP WPZ Management Area" are assumed to be protected and enhanced according to the goals described in this appendix. Corresponding improvements for wetlands within a RMP WPZ include the following wetland attributes: vegetative interspersion class, sediment delivery, pollutant discharge, nutrient loading, and vegetative quality. Further increases in these and other wetland attributes have not yet been quantified for basins to receive stormwater BMP enhancements, and therefore are not yet affected in the functional assessment results.

For wetland basins to become part of a flow through wetland system, existing low vegetative quality wetlands along the ditch alignment would need to be excavated. These wetland basins to be excavated would become a slightly deeper habitat, supporting heavily vegetated emergent species and limited open water, therefore increasing wetland attributes for amphibian breeding potential and amphibian overwintering. The soil removal associated with excavation would negatively affect outflow control, soil integrity and litter condition attributes for wetland basins along the flow through wetland system.

The assumption was made that all upland areas outside the RMP WPZ Management Areas will become heavily developed. None of the wetland basins outside a RMP WPZ are assumed to be drained and filled, but would be ranked with lower scores for the following wetland attributes: impervious drainage area, upland buffer width for water quality, upland buffer width for wildlife, vegetative interspersion class, wetland interspersion, fragmentation, sediment delivery, pollutant discharge, nutrient loading, upland buffer slope, litter conditions, amphibian breeding potential, amphibian overwintering, and vegetative quality.

Wetland functions evaluated are listed in the following table. A key to wetland indicator scoring is available upon request.

Table 19: Wetland Function Key

Wetland Functions	Wetland Function Description
A	Maintenance of Characteristic Hydrologic Regime
B	Flood/Stormwater/Attenuation
C	Downstream Water Quality
D	Maintenance of Wetland Water Quality
E	Maintenance of Characteristic Wildlife Habitat Structure
F	Maintenance of Characteristic Amphibian Habitat
G	Maintenance of Characteristic Fish Habitat
Veg	Vegetative Integrity

Comparison of repair alternatives according to wetland functions was done on the basis of wetland type for each function. The three alternatives were ranked highest to lowest according to score. When two alternatives have the same rank there was a tie.

Table 20. Comparison of Ditch Repair Alternatives According to Wetland Functions

(1 = highest rank).

Maintenance of Characteristic Hydrologic Regime

Wetland Type (Cowardin Classification)	Feasible Repair Alternative	No Action Alternative	RMP Alternative
PAB4G	2	2	1
PEM/FO1A	3	2	1
PEM/FO1B	1	2	1
PEMA	1	3	2
PEMB	2	3	1
PEMC	3	2	1
PEMF	1	3	2
PFO1A	1	3	2
PFO1B	3	2	1
PFO2B	2	2	1
PSS1A	2	2	1
PSS1B	1	3	2
PSS1C	3	2	1
PUBG	3	2	1

Flood/Stormwater Attenuation

Wetland Type (Cowardin Classification)	Feasible Repair Scenario	No Action Scenario	RMP Scenario
PAB4G	2	2	1
PEM/FO1A	3	2	1
PEM/FO1B	2	1	1
PEMA	1	3	2
PEMB	1	2	1
PEMC	3	2	1
PEMF	1	3	2
PFO1A	1	3	2
PFO1B	3	2	1
PFO2B	2	2	1
PSS1A	2	2	1
PSS1B	1	3	2
PSS1C	3	2	1
PUBG	3	2	1

Downstream Water Quality

Wetland Type (Cowardin Classification)	Feasible Repair Scenario	No Action Scenario	RMP Scenario
PAB4G	2	2	1
PEM/FO1A	3	2	1
PEM/FO1B	3	2	1
PEMA	1	3	2
PEMB	2	3	1
PEMC	3	2	1
PEMF	1	3	2
PFO1A	2	3	1
PFO1B	3	2	1
PFO2B	2	2	1
PSS1A	2	3	1
PSS1B	1	3	2
PSS1C	3	2	1
PUBG	3	2	1

Maintenance of Wetland Water Quality

Wetland Type (Cowardin Classification)	Feasible Repair Scenario	No Action Scenario	RMP Scenario
PAB4G	2	2	1
PEM/FO1A	2	2	1
PEM/FO1B	2	2	1
PEMA	1	3	2
PEMB	2	3	1
PEMC	3	2	1
PEMF	1	3	2
PFO1A	2	3	1
PFO1B	3	2	1
PFO2B	2	2	1
PSS1A	2	3	1
PSS1B	1	3	2
PSS1C	3	2	1
PUBG	3	2	1

Maintenance of Characteristic Wildlife Habitat Structure

Wetland Type (Cowardin Classification)	Feasible Repair Scenario	No Action Scenario	RMP Scenario
PAB4G	2	2	1
PEM/FO1A	3	2	1
PEM/FO1B	1	2	1
PEMA	1	3	2
PEMB	1	3	2
PEMC	3	1	2
PEMF	1	3	2
PFO1A	1	2	3
PFO1B	3	2	1
PFO2B	2	2	1
PSS1A	2	3	1
PSS1B	1	3	2
PSS1C	2	1	1
PUBG	3	2	1

Maintenance of Characteristic Amphibian Habitat

Wetland Type (Cowardin Classification)	Feasible Repair Scenario	No Action Scenario	RMP Scenario
PAB4G	2	2	1
PEM/FO1A	2	2	1
PEM/FO1B	2	2	1
PEMA	1	3	2
PEMB	2	3	1
PEMC	3	2	1
PEMF	1	3	2
PFO1A	2	3	1
PFO1B	3	2	1
PFO2B	2	3	1
PSS1A	2	3	1
PSS1B	1	3	2
PSS1C	3	2	1
PUBG	3	2	1

Maintenance of Characteristic Fish Habitat

Wetland Type (Cowardin Classification)	Feasible Repair Scenario	No Action Scenario	RMP Scenario
PAB4G	2	2	1
PEM/FO1A	2	2	1
PEM/FO1B	2	2	1
PEMA	1	3	2
PEMB	2	3	1
PEMC	3	2	1
PEMF	1	3	2
PFO1A	2	3	1
PFO1B	3	2	1
PFO2B	2	2	1
PSS1A	2	3	1
PSS1B	1	3	2
PSS1C	3	2	1
PUBG	3	2	1

Vegetative Integrity

Wetland Type (Cowardin Classification)	Feasible Repair Scenario	No Action Scenario	RMP Scenario
PAB4G	2	2	1
PEM/FO1A	2	2	1
PEM/FO1B	2	2	1
PEMA	2	3	1
PEMB	2	3	1
PEMC	3	2	1
PEMF	2	3	1
PFO1A	2	3	1
PFO1B	2	3	1
PFO2B	2	2	1
PSS1A	2	3	1
PSS1B	2	3	1
PSS1C	2	3	1
PUBG	3	2	1

APPENDIX L: COST ESTIMATES FOR DITCH REPAIR ALTERNATIVES

RCWD
ANOKA COUNTY DITCH 53-62 Resource Management Plan

COST SUMMARY TABLE

ITEM	DESCRIPTION	UNIT	QUANTITIES	UNIT PRICE	SUBHEADING SUBTOTAL	TOTAL	TOTAL+ 35% Conting., Engr., Legal, Admin.
Resource Management Plan							
Ditch Excavation						$85,000	$114,750
Mobilization, Erosion Control, Access		Ea.	1	$25,000	$25,000		
Excavation of Branch 1 Channel	Two-Stage Channel, Approximately 4,500 LF	C.Y.	3,500	$5	$17,500		
Excavation of Branch 2 Channel	Two-Stage Channel, Approximately 6,000 LF	C.Y.	4,500	$5	$22,500		
Excavation of Branch 3 Channel		C.Y.	0	$5	$0		
Excavation of Lateral 1, Branch 1 Channel		C.Y.	0	$5	$0		
Excavation of Lateral 3, Branch 2 Channel		C.Y.	0	$5	$0		
Excavation of Lateral 2, Branch 5 Channel	Two-Stage Channel, Approximately 2,700 LF	C.Y.	2,000	$5	$10,000		
Peebles Lateral		C.Y.	0	$5	$0		
Devine Lateral		C.Y.	0	$5	$0		
Revegetation	Seed and Mulch Disturbed Areas	Ac	10	$1,000	$10,000		
Water Quality/Sediment Control						$0	$0
Water Quality Basin(s)*		C.Y.	0	$4.50	$0		
Wetland Mitigation**						$0	$0
WCA Regulated Wetland Mitigation	Assumes a 1:1 replacement is required	Ac	0	$45,000	$0		
DNR Regulated Public Water Wetlands	Assumes a 1:1 replacement is required	Ac	0	$45,000	$0		
Culvert Replacements						$0	$0
Branch 1 @ Lever		L.F.	0	$100	$0		
Branch 1 @ Main Street		L.F.	0	$100	$0		
Branch 1 @ Hupp Street		L.F.	0	$450	$0		
Branch 1, Field Crossings/Driveway Crossings		Ea.	0	$4,000	$0		
Branch 1, Lat 1 @ 35W		L.F.	0	$1,000	$0		
Branch 1, Lat 1 @ 109th Avenue		L.F.	0	$450	$0		
Branch 1, Lat 1 @ Loch Park		L.F.	0	$75	$0		
Devine Lateral, Field Crossing		Ea.	0	$100	$0		
Lat 2, Branch 5, Field Crossings		Ea.	0	$7,500	$0		
Branch 2, Austin Court		L.F.	0	$450	$0		
Branch 2, 114th Lane		L.F.	0	$450	$0		
Control Structures						$125,000	$168,750
Branch 1, Management area B1.B	Control Structure designed to bounce small events	Ea.	1	$50,000	$50,000		
Branch 2, Management area B2.A	Control Structure designed to bounce small events	Ea.	1	$50,000	$50,000		
Branch 5, Lateral 2, Management area B5.C & D	Control Structure designed to split flows	Ea.	1	$25,000	$25,000		
Grand Total							**$283,500**

*cost does not include easement/land acquisition costs
** =Assumes mitigation sites would be found and developed as part of the repair. Otherwise, purchasing wetland credits could cost more.

RCWD

ANOKA COUNTY DITCH 53-62 FEASIBLE REPAIR

COST SUMMARY TABLE

ITEM	DESCRIPTION	UNIT	QUANTITIES	UNIT PRICE	SUBHEADING SUBTOTAL	TOTAL	TOTAL+ 35% Conting., Engr., Legal, Admin.
Feasible Repair							
Ditch Excavation						$258,000	$348,300
Mobilization, Erosion Control, Access		Ea.	1	$50,000	$50,000		
Excavation of Branch 1 Channel	Approximately 17,000 LF	C.Y.	16,000	$5	$80,000		
Excavation of Branch 2 Channel	Approximately 13,500 LF	C.Y.	7,000	$5	$35,000		
Excavation of Branch 3 Channel	Approximately 2,500 LF	C.Y.	2,000	$5	$10,000		
Excavation of Lateral 1, Branch 1 Channel	Approximately 1,000 LF	C.Y.	800	$5	$4,000		
Excavation of Lateral 3, Branch 2 Channel	Approximately 1,000 LF	C.Y.	1,000	$5	$5,000		
Excavation of Lateral 2, Branch 5 Channel	Approximately 4,500 LF	C.Y.	5,000	$5	$25,000		
Peebles Lateral	Approximately 3,000 LF	C.Y.	3,000	$5	$15,000		
Devine Lateral	Approximately 3,500 LF	C.Y.	1,000	$5	$5,000		
Revegetation	Seed and Mulch Disturbed Areas	Ac	29	$1,000	$29,000		
Water Quality/Sediment Control						$1,012,500	$1,366,875
Water Quality Basin(s)*	20-acres of pond(s) needed to address Golden Lake TMDL concerns	C.Y.	225,000	$4.50	$1,012,500		
Wetland Mitigation**						$1,620,000	$2,187,000
WCA Regulated Wetland Mitigation	Assumes a 1:1 replacement is required	Ac	29	$45,000	$1,305,000		
DNR Regulated Public Water Wetlands	Assumes a 1:1 replacement is required	Ac	7	$45,000	$315,000		
Culvert Replacements						$158,600	$214,110
Branch 1 @ Lever	24-inch RCP	L.F.	40	$100	$4,000		
Branch 1 @ Main Street	24-inch RCP	L.F.	86	$100	$8,600		
Branch 1 @ 121st Avenue	36-inch RCP	L.F.	42	$250	$10,500		
Branch 1 @ Hupp Street	48-inch RCP	L.F.	40	$450	$18,000		
Branch 1, Field Crossings/Driveway Crossings	36-inch CMP	Ea.	4	$4,000	$16,000		
Branch 1, Lat 1 @ 35W		L.F.	0	$1,000	$0		
Branch 1, Lat 1 @ 109th Avenue		L.F.	0	$450	$0		
Branch 1, Lat 1 @ Loch Park		L.F.	0	$75	$0		
Devine Lateral, Field Crossing	24-inch RCP	L.F.	100	$100	$10,000		
Lat 2, Branch 5, Field Crossings	48-inch CMP	Ea.	2	$7,500	$15,000		
Branch 2, Austin Court	48-inch RCP	L.F.	85	$450	$38,250		
Branch 2, 114th Lane	48-inch RCP	L.F.	85	$450	$38,250		
Grand Total							**$4,116,285**

*cost does not include easement/land acquisition costs

** =Assumes mitigation sites would be found and developed as part of the repair. Otherwise, purchasing wetland credits could cost more.

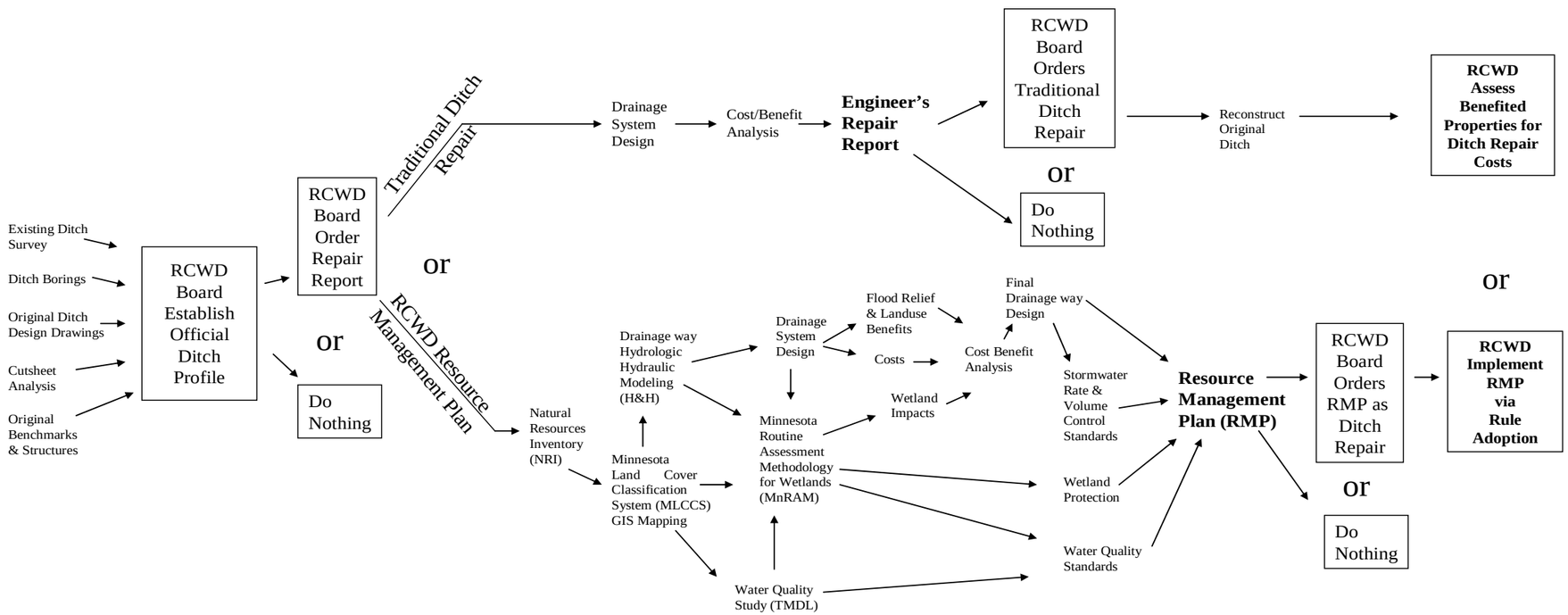
RCWD
ANOKA COUNTY DITCH 53-62 FULL REPAIR
COST SUMMARY TABLE

ITEM	DESCRIPTION	UNIT	QUANTITIES	UNIT PRICE	SUBHEADING SUBTOTAL	TOTAL	TOTAL+ 35% Conting., Engr., Legal, Admin.
Traditional Repair							
Ditch Excavation						$323,000	$436,050
Mobilization, Erosion Control, Access		Ea.	1	$50,000	$50,000		
Excavation of Branch 1 Channel	Approximately 17,000 LF	C.Y.	16,000	$5	$80,000		
Excavation of Branch 2 Channel	Approximately 13,500 LF	C.Y.	7,000	$5	$35,000		
Excavation of Branch 3 Channel	Approximately 2,500 LF	C.Y.	2,000	$5	$10,000		
Excavation of Lateral 1, Branch 1 Channel	Approximately 7,000 LF	C.Y.	4,000	$5	$20,000		
Excavation of Lateral 3, Branch 2 Channel	Approximately 1,000 LF	C.Y.	1,000	$5	$5,000		
Excavation of Lateral 2, Branch 5 Channel	Approximately 8,000 LF	C.Y.	13,000	$5	$65,000		
Peebles Lateral	Approximately 3,000 LF	C.Y.	3,000	$5	$15,000		
Devine Lateral	Approximately 3,500 LF	C.Y.	1,000	$5	$5,000		
Revegetation	Seed and Mulch Disturbed Areas	Ac	38	$1,000	$38,000		
Water Quality/Sediment Control						$1,012,500	$1,366,875
Water Quality Basin(s)*	20-acres of pond(s) needed to address Golden Lake TMDL concerns	C.Y.	225,000	$4.50	$1,012,500		
Wetland Mitigation**						$18,000,000	$24,300,000
WCA Regulated Wetland Mitigation	Assumes a 1:1 replacement is required	Ac	217	$45,000	$9,765,000		
DNR Regulated Public Water Wetlands	Assumes a 1:1 replacement is required	Ac	183	$45,000	$8,235,000		
Culvert Replacements						$406,600	$548,910
Branch 1 @ Lever	24-inch RCP	L.F.	40	$100	$4,000		
Branch 1 @ Main Street	24-inch RCP	L.F.	86	$100	$8,600		
Branch 1 @ 121st Avenue	36-inch RCP	L.F.	42	$250	$10,500		
Branch 1 @ Hupp Street	48-inch RCP	L.F.	40	$450	$18,000		
Branch 1, Field Crossings/Driveway Crossings	36-inch CMP	Ea.	4	$4,000	$16,000		
Branch 1, Lat 1 @ 35W	60-inch RCP (Tunneling under I-35W)	L.F.	200	$1,000	$200,000		
Branch 1, Lat 1 @ Loch Park	Add 2-24-inch CMP	L.F.	48	$75	$3,600		
Devine Lateral, Field Crossing	24-inch RCP	L.F.	100	$100	$10,000		
Lat 2, Branch 5, Field Crossings	48-inch CMP	Ea.	3	$7,500	$22,500		
Branch 2, Austin Court	48-inch RCP	L.F.	85	$450	$38,250		
Branch 2, 114th Lane	48-inch RCP	L.F.	85	$450	$38,250		
Grand Total							**$26,651,835**

*cost does not include easement/land acquisition costs
** =Assumes mitigation sites would be found and developed as part of the repair. Otherwise, purchasing wetland credits could cost more.

APPENDIX M: REPAIR OPTIONS AND RMP SCHEMATIC

Figure 26: Repair Options and RMP Schematic



APPENDIX N. INTERAGENCY COORDINATION AND TECHNICAL MEMORANDA (Separate Binding)

APPENDIX O: Landowner Benefits of RMP

This appendix contains a discussion of landowner benefits associated with the RMP ditch repair alternative. As part of a ditch repair report, it is the drainage authority's responsibility to consider the cost and benefits related to the various repair projects. The RMP fulfills the obligations required of a Repair Report. Discussions related to the cost-benefit analysis are included in

- Section I. Executive Summary,
- Section III. Comparison of Ditch Repair Alternatives and,
- Appendix L: Cost Estimates for Ditch Repair Alternatives.

This appendix focuses more specifically on the benefits landowners receive from the RMP.

Traditionally, landowners "benefited" from ditch repair projects by increasing the drainage efficiency of the ditch and therefore enhancing the use of their property for agricultural purposes. In the case of 53-62, current wetland laws make a traditional repair of the ditch unfeasible, both from a cost and legal perspective. In addition, the lateral effect estimates have shown that even if the ditch could feasibly be repaired, the resulting dewatering would potentially drain inaccessible narrow strips of land within a large wetland basin or simply convert an existing wetland to a less wet type. In either case, for the purposes of land development, little benefit can be gained for such a repair project.

As the watershed of ACD 53-62 continues to develop, the RMP ditch repair alternative provides many benefits to landowners but not in the traditional sense of wetland drainage. The RMP provides a framework for development that shapes how development occurs in the watershed for the betterment of all parties. The Wetland Preservation Zone is a critical planning element that adds value to properties developing within the RMP. There also are many benefits associated with expedited permitting, and mitigation flexibility.

In summary the RMP provides the following tangible benefits to property owners within the RMP:

- Streamlined Local, State and Federal Permitting
- Storm Water Management
- Expanded Range and Flexibility of Mitigation Options
- Expanded Opportunity for Wetland Credits
- Increased Land Value for Properties Associated with Preserved Open Space

Streamlined Local, State and Federal Permitting

The RMP was developed in close coordination with state and federal permitting authorities. The identification of high priority resources in advance, eliminates costly redesign. In addition a consensus has been built by the RCWD implementing the Wetland Conservation Act and the United States Army Corps of Engineers implementing Section 404 of the Clean Water Act on acceptable sequencing, mitigation and restoration strategies. The applicant can save time and money in the permitting process.

Storm Water Management
Extensive stormwater modeling was conducted prior to and through the development of the RMP. The modeling has helped define flood elevations as well as normal operating water levels for the large wetland basins. The flood elevations are used to set low floor elevations for buildings and the normal water levels for ponding and wetland features that are necessary to meet water quantity goals. In addition to water quantity, the RMP also incorporates water quality considerations for the Golden Lake TMDL. Working in advance of development to establish the TMDL goals, greatly minimizes the risk of a development moratorium similar to the Annandale, Minnesota case.

Expanded Range and Flexibility of Mitigation Options
The RMP includes many options for meeting wetland mitigation requirements. Focus is placed on enhancing and restoring existing wetlands rather than utilization of existing upland to meet wetland mitigation requirements. In addition, some of the required stormwater infiltration features are eligible for wetland replacement credit. The RMP also considers wetland function at a landscape level. The wetland functional assessment conducted through the development of the RMP is a great benefit to developers as they conduct their site specific wetland functional assessments.

Expanded Opportunity for Wetland Credits
Many of the large wetlands identified within the WPZ have excellent restoration potential under the RMP. The ability to restore and create functioning wetlands within a property creates a commodity that is marketable. Property owners within the RMP may have wetland credit needs if they are not able to meet mitigation requirements on site and credits may also be eligible for deposit into the State BWSR bank. The cash value of wetland credits can be an excellent incentive for landowners to restore degraded ditched wetlands.

Increased Land Value for Properties Associated with Preserved Open Space
Preserving and maintaining natural areas and natural resources certainly benefits the resources themselves, the wildlife that depend on them, and the water quality of the resource and downstream resources. However, preservation of natural open space can also maintain and increase local property values. Proximity to open space, especially natural open space, adds value to nearby properties. A study by the Wilder Foundation, *The Economic Value of Open Space: Implications for Land Use Decisions* (Anton, 2005), compared the results of five economic analysis studies completed in the Twin Cities metropolitan area and determined that open space increases the value of nearby properties. One of these five studies focused on the impact of wetlands on property values in Ramsey County. This study found that proximity to a wetland, especially a shrub wetland, consistently increased property values. A study in Dakota County found that properties near open space showed higher property values than those away from open space. Overall, the Wilder report concludes that open space leads to higher property values and that communities should take this effect on property values into consideration when evaluating land use decisions.